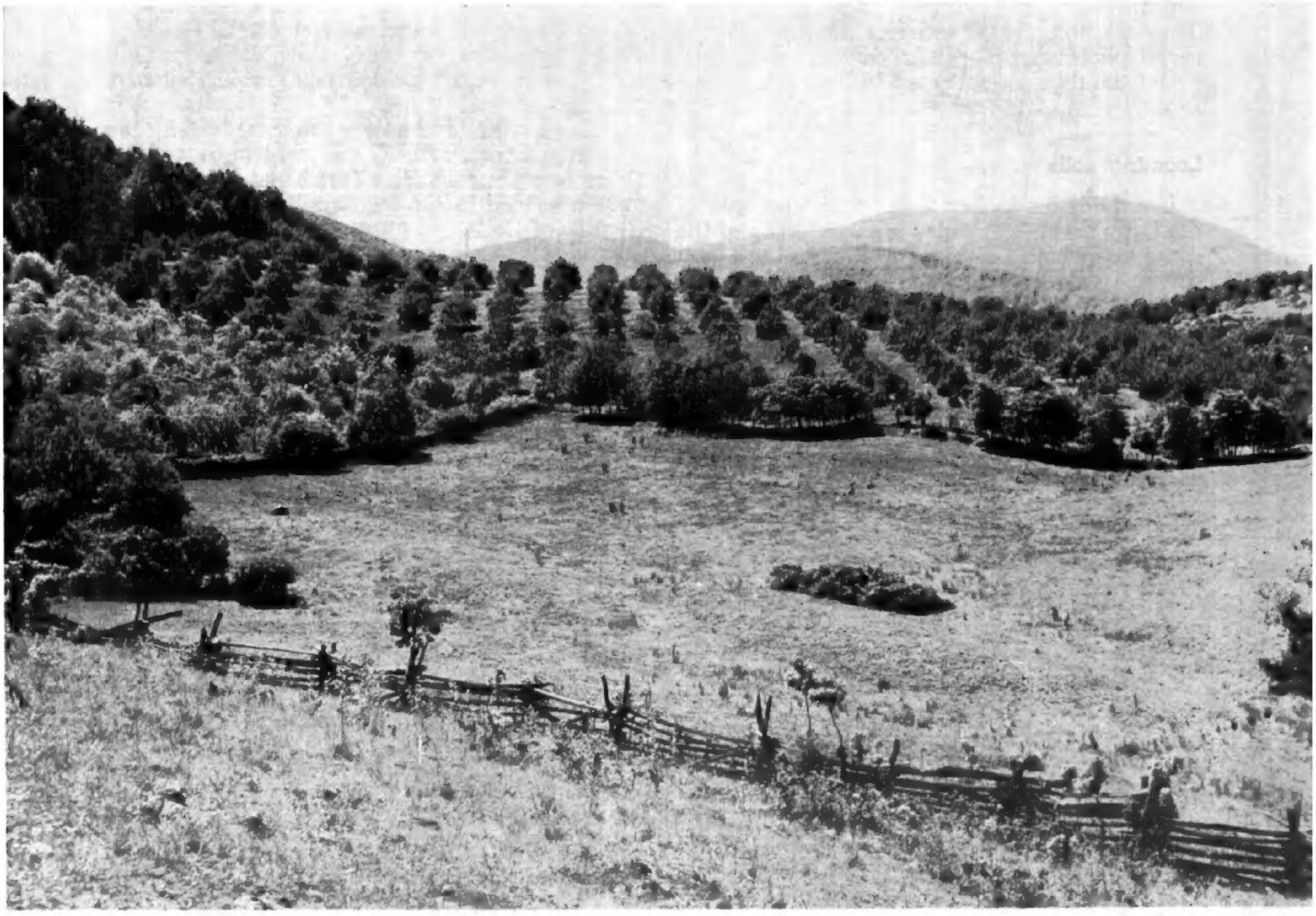
Series 1958, No. 11 Issued October 1961

SOIL SURVEY

Rappahannock County Virginia



UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
in cooperation with
VIRGINIA AGRICULTURAL EXPERIMENT STATION

HOW TO USE THE SOIL SURVEY REPORT

THIS SOIL SURVEY of Rappahannock County, Va., is designed to serve several groups of readers. It will help farmers in planning the kind of management that will protect their soils and provide good yields; assist engineers in selecting sites for roads, buildings, ponds, and other structures; aid foresters in managing woodlands; and add to soil scientists' fund of knowledge.

In making this survey, soil scientists walked over the fields and woodlands. They dug holes and examined surface soils and subsoils; measured slopes with a hand level; noticed differences in growth of crops, weeds, and brush; and, in fact, recorded all the things about the soils that they believed might affect their suitability for farming, engineering, and related uses. They plotted the boundaries of the soils on aerial photographs. Then, cartographers prepared the detailed soil map in the back of this report.

Locating soils

Use the index to map sheets to locate areas on the large map. The index is a small map of the county on which numbered rectangles have been drawn to show where each sheet of the large map is located. When the correct sheet of the large map has been located, it will be seen that boundaries of the soils are outlined and that there is a symbol for each kind of soil. All areas marked with the same symbol are the same kind of soil, wherever they appear on the map. The symbol will be inside the area if there is enough room; otherwise, it will be outside the area and a pointer will show where the symbol belongs.

Finding information

Few readers will be interested in all of the soil report, for it has special sections for different groups, as well as some sections of value to all. The section, Additional Facts About the County, will be of interest mainly to those not familiar with the county.

Farmers and those who work with farmers will be interested in the section, The Soils of Rappahannock County, and in the section, Use and Management of Soils. Study of these sections will aid them in identifying soils on a farm, in learning ways the soils can be managed, and in judging what yields can be expected. The guide for mapping units at the back of the report will simplify use of the map and the report. This guide gives the map symbol for each soil, the name of the soil, the page on which the soil is described, the capability unit in which the soil has been placed, and the page where the capability unit is described.

Engineers will want to refer to the section, Engineering Properties of Soils. Tables in that section show characteristics of the soils that affect engineering.

Soil scientists and others concerned with the scientific aspects of soils will find information about how the soils were formed and how they were classified in the section, Morphology and Genesis of Soils.

Students, teachers, and other users will find information about soils and their management in various parts of the report, depending on their particular interest.

* * *

To provide information for good land use, this survey was made cooperatively by the United States Department of Agriculture and the Virginia Agricultural Experiment Station. The survey is part of the technical assistance furnished by the Soil Conservation Service to the Culpeper Soil Conservation District, which was organized on October 4, 1939. Fieldwork for the survey was completed in 1958. Except where otherwise stated, this report refers to conditions at the time the survey was made.

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Series 1958, No. 11

Issued October 1961

SOIL SURVEY OF RAPPAHANNOCK COUNTY, VIRGINIA

FIELD SURVEY BY C. S. COLEMAN and J. F. DERTING, VIRGINIA AGRICULTURAL EXPERIMENT STATION, and J. B. CARTER, SOIL CONSERVATION SERVICE

REPORT BY J. B. CARTER, SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE VIRGINIA AGRICULTURAL EXPERIMENT STATION

RAPPAHANNOCK COUNTY is mainly agricultural. Its climate and soils are well suited to pasture, orchards, and hay crops. More than 50 percent of all land in farms is in pasture, and hay is the most extensive crop. Corn, wheat, barley, and other crops are grown, mainly to be fed to livestock rather than sold. Beef cattle is the principle livestock, and sheep, hogs, poultry, and dairy cattle are also raised. Livestock products produce most of the farm income. Apple growing is important, and the county ranks tenth in Virginia in the sale of tree fruits. Lumbering and grain milling are the chief industries, and one plant processes apple juice.

General Nature of the Area

Rappahannock County is in the northern part of Virginia (fig. 1). Washington, the county seat, is about 65 miles southwest of Washington, D.C., and 90 miles north-

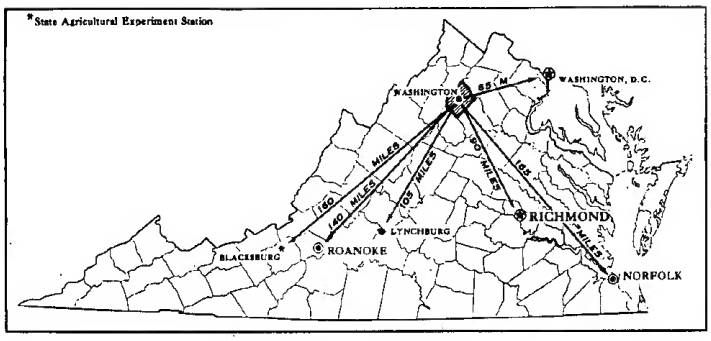

Figure 1.—Location of Rappahannock County in Virginia.

west of Richmond, the State capital. The county extends north and south about 24 miles and east and west about 21 miles. It has an area of about 267 square miles. The northwestern boundary is in the Blue Ridge Mountains and separates the county from Page and Warren Counties. The Rappahannock River forms the northeastern boundary and separates the county from Fauquier County. The county is bounded on the southeast by Culpeper County and on the southwest by Madison County.

Physiography, Relief, and Drainage

Rappahannock County lies in both the Blue Ridge and the Piedmont physiographic provinces. Figure 2 is a view showing the varied relief in Rappahannock County. About 70 percent of the county is in the Piedmont Plateau, which is subdivided into the gently sloping to sloping plateau and the moderately steep to steep plateau.

The Blue Ridge province is in the northwestern part of the county. It consists of the Blue Ridge Mountains and the outlying mountains or foothills. In the foothills are Hot, Hazel, Oventop, Pignut, and Big Jenkins Mountains and The Peak. The foothills are underlain mostly by granitic rock but partly by phyllite. The Blue Ridge Mountains are underlain by greenstone and granitic rock and by a small extent of sandstone.

The Blue Ridge province is steep and rugged. Large rocks crop out or are scattered on most of the mountain slopes. Elevations in the mountains range from 1,000 to 3,720 feet at The Pinnacle, which is the highest point in the county. Most of the province is well drained, but some small areas of colluvial material at the foot of the mountains are poorly drained. The Myersville and Porters soils and Stony local alluvial land are the most extensive soils in the province.

The Piedmont province is an old plain that is strongly dissected by many small streams that flow in narrow, winding valleys. It is underlain by granitic rock, arkosic sandstone, quartzite, and phyllite. The province is broken in places by long, low hills and mountains, especially in areas near Woodville.

Figure 3 shows how these mountains are scattered in the Piedmont section of the county. Most of the mountains are moderately steep to steep, but some are very steep. In altitude they range from 900 to 1,500 feet above sea level. The soils are stony and have outcrops of small rock ledges. The most extensive soils in the Piedmont province are of the Eubanks and Lloyd, Chester, Brandywine, Culpeper, Albemarle, Louisburg, and Hazel series.

The smoother part of the Piedmont section is mostly sloping to gently sloping, but it has some moderately

Figure 2.—**Blue Ridge Mountains in the background, moderately steep to steep areas of the Piedmont Plateau in the right center, and sloping areas of the Piedmont Plateau in the foreground.**

steep areas. The altitude ranges from 360 to 900 feet above sea level. The lowest point is where the Rappahannock River flows out of the county. The wide variations in relief and elevation had an important bearing on the different soils that developed in the county.

All streams in the county drain into the Rappahannock River. The Hazel, Rush, Covington, Thornton, and Rappahannock Rivers have their source in springs in the Blue Ridge Mountains. Drainage in the county is well developed. Most of the small streams flow southeastward, parallel to the mountain ridges. The Rappahannock and Jordan Rivers drain the northern part of the county; Battle Creek and the Rush, Covington, and Thornton Rivers drain the central part; and the Hazel and Hughes Rivers drain the southern part.

Climate

Rappahannock County has a warm, continental climate. Winter is rigorous but not very severe, although frequently it is quite cold for short periods. The difference between the average temperatures of summer and winter is only 38.2° F. The climatic data compiled at the United States Weather Bureau Station at Culpeper, Va., are given in table 1. Table 2 shows the average precipitation at Washington for a 12-year period from 1945 to 1956 and the wettest and driest years during that period. The records at Culpeper are used because those at the weather stations in this county are incomplete and cover only a few years. The averages in Rappahannock County are similar to those at Culpeper, but temperatures are 2 to 3 degrees lower. The temperature, rainfall, and frost data in the mountainous parts of the county differ from those in the lower, smoother areas.

Fields and roads are normally open enough throughout winter to permit outdoor work. The winter crops seldom receive enough snow for protection, but wheat, barley, rye, hardy winter oats, and alfalfa grow on the well-drained soils with little danger of winterkilling. Frost has occurred as late as April 27 and as early as October 7, but the average frost-free period, or the growing season, is 192 days. It extends from April 15 to October 24. In Rappahannock County, especially in places in and near the mountains, the frost-free period is 4 or 5 days shorter on the average than at Culpeper.

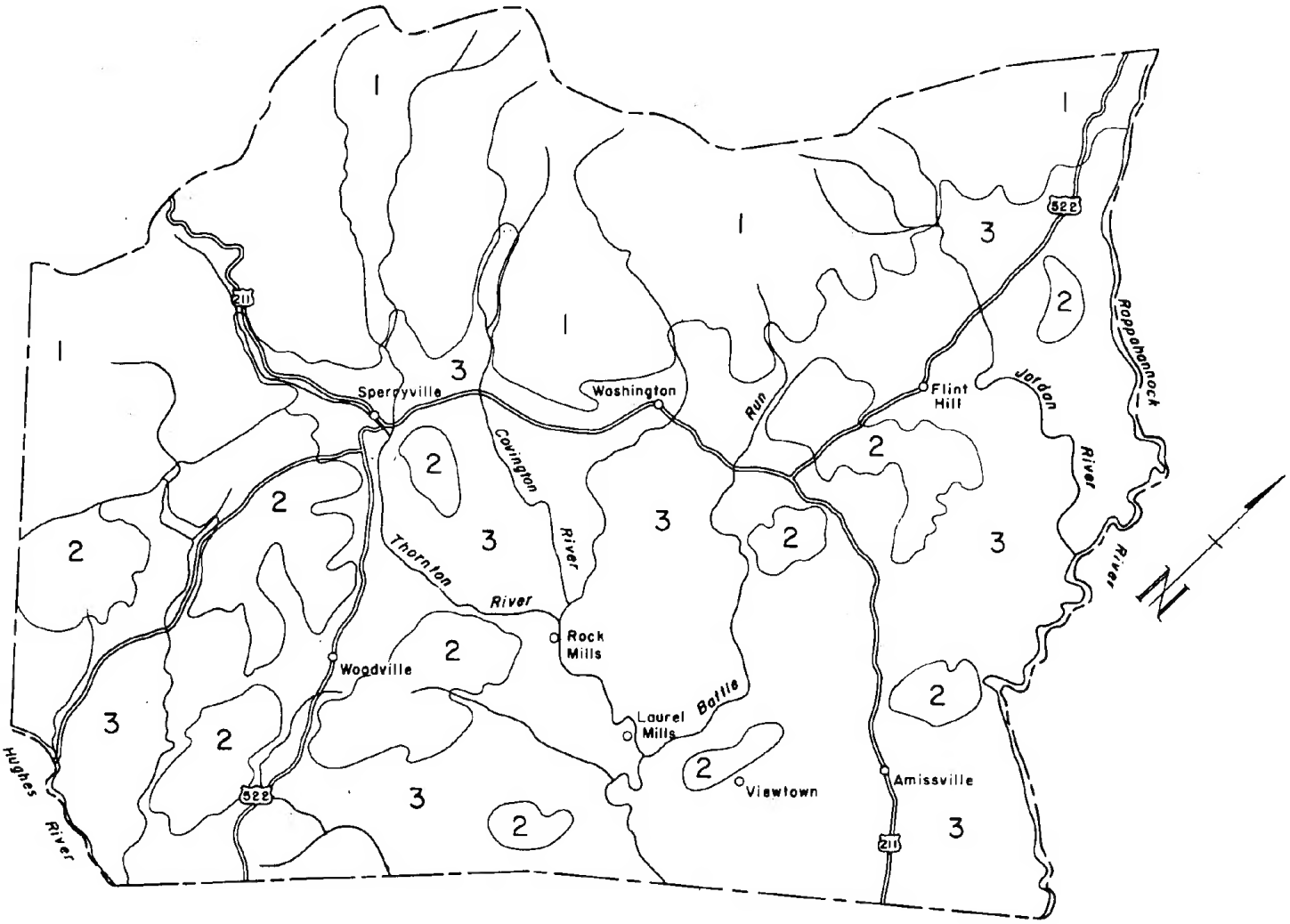

Figure 3.—**Relief map of Rappahannock County, Va.: (1) Blue Ridge Mountains: steep and very steep; some moderately steep. (2) Low mountains of the Piedmont: mostly moderately steep; some steep and sloping. (3) Smoother Piedmont area: mostly sloping and gently sloping; some moderately steep.**

This gives ample time, however, for all the common crops to mature. The grazing period extends from about the first of May to the last of October. Except in the most severe winters, most farmers allow their beef cattle to run in pasture or feed lots (fig. 4). Milk cows generally remain in barns and are turned out for only short periods.

The rainfall is moderately well distributed throughout the year. Most rain comes in summer and spring when it is needed by growing crops and pasture. The growth of most pasture plants, however, decreases from late in July to early in September, probably because at this time the temperature is too high for good growth. Rains in spring and fall are normally slow and steady, but heavy downpours and thunderstorms are frequent late in summer. Long wet spells are not frequent, but short dry or wet periods are. These dry or wet periods affect the growth of most crops, particularly the grain,

Figure 4.—**Cattle in an open field during winter.**

TABLE 1.—*Temperature and precipitation at Culpeper Station, Culpeper County, Virginia*

[Elevation, 475 feet]

Month	Temperature [1]			Precipitation [2]			
	Average	Absolute maximum	Absolute minimum	Average	Driest year (1930)	Wettest year (1948)	Average snowfall
	°F.	°F.	°F.	Inches	Inches	Inches	Inches
December	36.2	75	−7	3.12	2.75	6.43	3.9
January	34.7	80	−20	2.99	2.70	3.97	6.4
February	36.3	84	−9	2.40	1.65	1.20	4.1
Winter	35.7	84	−20	8.51	7.10	11.60	14.4
March	45.3	91	5	2.90	2.45	3.54	3.1
April	54.4	96	14	3.36	2.40	4.95	2.2
May	64.1	100	29	4.02	2.72	8.14	[3]
Spring	54.6	100	5	10.28	7.57	16.63	5.3
June	72.0	103	37	4.97	2.40	4.85	[3]
July	75.7	107	48	3.82	.92	5.43	0
August	73.9	101	45	4.80	.41	7.74	0
Summer	73.9	107	37	13.59	3.73	18.02	[3]
September	68.1	100	31	3.24	1.04	3.71	0
October	56.3	99	18	3.16	.19	4.27	.1
November	45.2	86	6	2.49	1.34	5.46	.4
Fall	56.5	100	6	8.89	2.57	13.44	.5
Year	55.2	107	−20	41.27	20.97	59.69	20.2

[1] Average temperature based on a 46-year record, through 1955; highest and lowest temperatures on a 43-year record, through 1952.
[2] Average precipitation based on a 48-year record, through 1955; wettest and driest years based on a 45-year record, in the period 1908–1955; snowfall based on a 43-year record, through 1952.
[3] Trace.

TABLE 2.—*Precipitation at Washington, Rappahannock County, Virginia, 1945 to 1956*

[Elevation 694 feet]

Month	Precipitation		
	Average	Total for driest year (1953)	Total for wettest year (1948)
	Inches	Inches	Inches
December	2.52	3.09	3.45
January	2.24	3.59	2.99
February	1.90	1.34	.65
Winter	6.66	8.02	7.09
March	2.80	3.78	1.66
April	3.33	3.00	5.20
May	3.73	5.27	6.42
Spring	9.86	12.05	13.28
June	3.50	2.54	2.99
July	4.18	.96	4.55
August	5.27	2.07	10.33
Summer	12.95	5.57	17.87
September	3.52	1.23	3.97
October	2.52	1.69	3.20
November	2.76	2.02	5.60
Fall	8.80	4.94	12.77
Year	38.27	30.58	51.01

and cause yields to vary. Also, they delay the harvesting of small grains and hay and the cultivation of corn. The extremely dry summer and fall in 1930 and in 1941 damaged most crops and all of the pasture. In the wettest year, 1948, the rainfall at Culpeper was 59.69 inches.

The prevailing winds are from the west. The average hourly wind velocity is greatest in spring, but the velocity of the wind is seldom high. Hailstorms seldom occur and generally affect only small areas. According to records from the nearest stations where humidity is recorded, the average annual relative humidity is approximately 75 percent at 8:00 a. m.; 56 percent at noon; and 68 percent at 8:00 p. m. The humidity is normally highest late in summer and in fall, but month-to-month variation in relative humidity is not great.

The Soils of Rappahannock County

Nearly all of the soils in Rappahannock County contain three definite layers that are surface soil, subsoil, and substratum. These layers differ greatly from each other in such characteristics as color, texture, consistence, structure, depth, permeability, reaction, and fertility. These characteristics affect the productivity, workability, and conservability of the soils and the uses to which they are suited. In most soils the surface layer is coarser in texture than the subsoil. The subsoil is underlain by the substratum, which in different soils consists of weathered rock, alluvial material deposited near or adjacent to streams, or colluvial material deposited at the base of slopes. In many places a developed subsoil higher in clay content is not present, and the surface layer grades into decomposed rock.

Soil Series and Their Relations

The soils of Rappahannock County are in 27 different soil series. The relationships of these series are more easily understood if they are grouped according to their origin and topographic position. They are grouped in this way in table 3. The five groups are (1) soils of the uplands; (2) soils of the terraces; (3) soils of the old colluvial slopes; (4) soils of the recent colluvial slopes; and (5) soils of the bottom lands.

Soils of the uplands are at the highest elevations and consist of material derived directly through the decay of the underlying rocks. The properties of the soils of the uplands generally are closely related to the characteristics of these rocks.

Colluvial soils are on slopes from the upland or at the foot of such slopes. The soils in colluvial positions formed in material that accumulated from higher slopes.

Soils of the terraces consist of waterborne materials bordering on stream deposits, but they are at an eleva-

tion where they are no longer subject to flooding. Soils of the bottom lands are level or nearly level, are forming in waterborne material bordering streams, and are subject to flooding.

In addition to the 27 soil series, there are several miscellaneous land types, which occur in different topographic positions as will be explained in the text that follows.

Soils of the uplands

The soils of the uplands are residual soils that formed on the higher lands above the stream valleys. They formed in material weathered from the underlying, decomposed parent rock, and their properties are generally influenced by the kind of underlying rock. Some of these soils formed in material weathered from basic rocks (mostly greenstone), and some from acidic rocks (mostly sandstone and some type of granite). The Brandywine are the most extensive of the soils of the uplands. The soil series and miscellaneous land types are discussed in approximately the order they appear in table 3, but some are grouped to emphasize their similarity of origin.

Albemarle, *Culpeper*, and *Louisburg* soils have the same kind of parent material, which was derived from arkosic sandstone, quartzite, and phyllite. They have a fairly light-colored surface layer, and quartz gravel occurs throughout their profile. This group of soils is in the eastern part of the county. The Louisburg soils are more extensive than the Culpeper and Albemarle.

The Albemarle soils have a grayish-brown fine sandy loam surface layer and a friable, yellowish-brown to yellowish-red clay loam subsoil. Slopes range from 2 to 14 percent. These well-drained soils are low in organic matter and in natural fertility and are strongly acid. The leaching of plant nutrients is severe.

The Culpeper soils have a dark grayish-brown loam surface layer and a firm, red clay subsoil. Slopes range from 2 to 25 percent. These well-drained soils are low in organic-matter content and in natural fertility. Although very strongly acid, they respond well to good management.

The Louisburg soils have a grayish-brown sandy loam surface layer and little or no subsoil development. Slopes range from 7 to 45 percent. The soils are shallow to bedrock and excessively drained. They are very low in content of organic matter and in natural fertility and are very strongly acid to extremely acid. The Louisburg soils are more stony than the Albemarle and Culpeper soils.

Belvoir soils have a light yellowish-brown loam surface layer and a yellowish-brown subsoil that has gray mottles. These moderately well drained to somewhat poorly drained soils are medium to low in organic-matter content and in natural fertility. They occur in depressions at the heads of drainageways or on upland flats. Slopes range from 2 to 7 percent.

Brandywine soils have a brown loam surface layer, and though little or no subsoil has developed, where it does occur it is yellowish brown. The weakly developed subsoil, or B horizon, is evident only in the type with loam texture and is 4 inches thick. Brandywine soils are somewhat excessively drained and are normally shallow to bedrock or to decomposed rock material. They are medium in content of organic matter and in natural fertility. Brandywine gritty loams have parent material derived from coarser textured granitic rock than that of Brandywine loams and do not have a subsoil, or B horizon. Brandywine silt loams contain more mica and are more erodible than other Brandywine soils. Brandywine rocky loams have numerous rock outcrops, and Brandywine stony loams have loose stones on the surface.

Chester soils have a brown loam surface layer and a strong-brown silty clay loam subsoil. These well-drained soils are medium in content of organic matter, fairly high in natural fertility, and medium acid to very strongly acid. Slopes range from 2 to 14 percent. Although their texture is mainly loam, silt loam has developed where the parent material has been sheared or crushed. The Chester silt loams are strongly micaceous both in the B and C horizons. A complex of Chester-Brandywine soils is mapped where the two series are so intricately associated it is not practical to map them separately.

Eubanks-Brandywine complex consists of soils of two series so intricately associated that it was not practical to separate them on the map.

Eubanks-Chester complex consists of areas of Eubanks and Chester soils that are too small and too intricately associated for separate delineation on the soil map.

Eubanks and Lloyd soils, mapped together as undifferentiated soil groups, have brown to reddish-brown loam surface layers and red sandy clay loam to clay subsoils. These well-drained soils are fairly high in content of organic matter and in natural fertility. They are medium acid to very strongly acid but respond well to good management. In most places slopes range from 2 to 25 percent, but in a few areas they are as steep as 45 percent.

Halewood and Porters soils have similar parent material, which was derived from granodiorite and granite. They occur in or near the Blue Ridge Mountains and are stony on the surface and throughout the profile. The Porters soils are at higher elevations than the Halewood soils.

Halewood soils have a brown fine sandy loam surface layer and a yellowish-red sandy clay loam subsoil. They are well drained, medium in content of organic matter and in natural fertility, and strongly acid. Slopes range from 7 to 25 percent. Loose stones and some rock outcrops are characteristic.

The Porters soils have a very dark brown to black loam surface layer and a weakly developed, yellowish-brown, friable sandy clay loam subsoil. These well-drained soils are high in organic-matter content, medium in natural fertility, and strongly acid. Slopes range from 2 to 45 percent or more.

Myersville and Catoctin soils formed in material weathered from greenstone, a basic rock that occurs in the Blue Ridge Mountains.

The Myersville soils have a dark-brown to dark reddish-brown silt loam surface layer and a friable, reddish-brown to dark-red silty clay loam subsoil. They are well drained and are high in content of organic matter and in natural fertility. These stony soils are in the Blue Ridge Mountains. In most areas slopes range from 2 to 25 percent, but in a few areas they are as steep as 45 percent.

TABLE 3.—*Principal characteristics*

Soil series or land type	Parent material	Internal drainage	Dominant relief	Slope range of soils mapped	Surface soil: Color
				Percent	
SOILS OF THE					
Albemarle	Arkosic sandstone, quartzite, and phyllite.	Good	Gently sloping	2–14	Grayish brown
Belvoir	Marshall granite, Lovingston granite, granodiorite, and sandstone.	Moderately good to somewhat poor.	Gently sloping	2–7	Brown to light yellowish brown.
Brandywine	Marshall granite, Old Rag granite, granodiorite, and Lovingston granite.	Somewhat excessive.	Moderately steep	2–45+	Brown to dark brown
Catoctin	Greenstone	Excessive	Steep	25–45	Grayish brown to yellowish brown.
Chester	Marshall granite, Lovingston granite, and granodiorite.	Good	Gently sloping	2–14	Brown to dark brown
Chester-Brandywine	Granodiorite, Lovingston granite, Marshall granite, and Old Rag granite.	Good to somewhat excessive.	Sloping	2–14	Brown to dark brown
Culpeper	Arkosic sandstone, quartzite, and phyllite.	Good	Sloping	2–25	Dark grayish brown to brownish yellow.
Eubanks-Brandywine	Lovingston granite, granodiorite, and Marshall granite.	Good to somewhat excessive.	Sloping	2–25	Brown to dark brown
Eubanks-Chester	Lovingston granite, granodiorite, and Marshall granite.	Good	Gently sloping	2–14	Brown to dark brown
Eubanks and Lloyd	Lovingston granite, Marshall granite, and granodiorite.	Good	Sloping	2–25	Brown to reddish brown.
Halewood	Marshall granite and granodiorite	Good	Steep	7–25+	Dark brown to yellowish brown.
Hazel	Phyllite, sandstone, and Marshall granite mixed.	Excessive	Moderately steep	7–25+	Brown to dark brown
Louisburg	Arkosic sandstone, quartzite, and phyllite.	Excessive	Moderately steep	7–25+	Grayish brown to light brownish gray.
Made land	Mixed material				
Myersville	Greenstone	Good	Sloping	7–25	Dark brown to dark reddish brown.
Porters	Granodiorite	Good	Steep	2–45	Very dark brown to black.
Ramsey	Sandstone and quartzite	Excessive	Steep	14–45	Pale brown to very dark gray.
Rock land, acidic	Sandstone, granodiorite, and Marshall granite.	Good to excessive	Moderately steep	7–45+	
Rock land, basic	Greenstone	Good to excessive	Moderately steep	7–45+	
Rock outcrop	Greenstone and granodiorite	Excessive	Moderately steep	7–45+	
Very rocky land	Sandstone, greenstone, granodiorite, and Marshall granite.	Excessive to good	Steep	14–45+	
SOILS OF THE					
Altavista	Moderately young alluvium from acidic rocks.	Good to moderately good.	Nearly level	0–7	Light yellowish brown
Augusta	Moderately young alluvium from acidic rocks.	Moderately good to somewhat poor.	Nearly level	0–7	Light yellowish gray
Hiwassee	Old alluvium from basic rocks	Good	Sloping	2–14	Dark brown to dark reddish brown.
Roanoke	Moderately young alluvium from acidic rocks	Poor	Nearly level	0–2	Light gray, mottled
Wickham	Moderately old alluvium from acidic rocks.	Good	Gently sloping	2–7	Brown to dark brown
SOILS OF THE OLD					
Dyke	Greenstone and granodiorite	Good	Gently sloping	2–14	Reddish brown to dark reddish brown.
Stony colluvial land	Greenstone and granodiorite	Excessive	Moderately steep	7–45	
Stony local alluvial land.	Greenstone and granodiorite	Good	Sloping	2–25	Dark brown
Unison	Greenstone and granodiorite	Good	Gently sloping	2–14	Dark brown

of the soil series

UPLANDS

Surface soil—Continued		Subsoil			
Texture	Thickness	Color	Consistence	Texture	Thickness
	Inches				*Inches*
Fine sandy loam	6–12	Yellowish red	Friable	Clay loam	8–30
Loam	6–16	Mottled yellowish brown, brown, and gray.	Firm to plastic	Silty clay loam	12–26
Gritty loam, silt loam, and loam.	6–18	If present, is yellowish brown	Very friable	Loam to sandy clay loam	0–4
Silt loam	6–20				(1)
Loam and silt loam	5–14	Strong brown	Friable	Silty clay loam	8–24
Loam	5–18	Strong brown	Friable	Silty clay loam	0–20
Loam	0–12	Red	Friable to firm	Clay	18–50
Loam	3–18	Red to yellowish red	Friable	Sandy clay loam to clay	0–28
Loam	6–14	Red and strong brown	Friable	Clay to silty clay loam	18–55
Loam and clay loam	0–12	Red to dark red	Friable to firm	Sandy clay loam to clay	14–55
Fine sandy loam	6–12	Yellowish red to strong brown	Friable to very friable.	Sandy clay loam to clay loam	10–24
Loam	2–14				(1)
Sandy loam	6–16				(1)
	(2)				(1)
Silt loam	4–9	Reddish brown to dark red	Friable	Silty clay loam to clay	8–26
Loam	8–18	Strong brown to yellowish brown.	Very friable	Sandy clay loam	0–26
Fine sandy loam	2–12				(1)
	(2)				(1)
	(2)				(1)
	(2)				(1)
	(2)				(1)

TERRACES

Loam	8–14	Yellowish brown	Friable	Silty clay loam to clay loam	18–32
Silt loam	8–12	Mottled	Friable	Clay loam to silty clay loam	18–36
Loam and clay loam	0–14	Dark red	Firm	Clay	30–100
Silt loam	8–14	Highly mottled	Plastic	Clay	24–38
Loam	4–14	Brown to yellowish brown	Friable	Clay loam to clay	30–80

COLLUVIAL SLOPES

Loam and clay loam	0–14	Dark red	Firm	Clay	30–80
	(2)				(1)
Loam	10–25	Brown to yellowish brown	Very friable	Sandy clay loam	10–25
Loam	4–14	Brown to reddish brown	Friable	Clay loam	18–40

TABLE 3.—*Principal characteristics*

Soil series or land type	Parent material	Internal drainage	Dominant relief	Slope range of soils mapped	Surface soil: Color
SOILS OF THE RECENT					
				Percent	
Meadowville	Lovingston granite and sandstone, Old Rag granite, Marshall granite, and granodiorite.	Moderately good to good.	Gently sloping	2–7	Dark brown to reddish brown.
Worsham	Lovingston granite, Marshall granite, Old Rag granite, sandstone and granodiorite.	Poor	Gently sloping	0–7	Grayish brown, mottled.
SOILS OF THE					
Alluvial land	Young alluvium	Variable	Nearly level	0–2	Variable
Buncombe	Young alluvium	Excessive	Nearly level	0–2	Light brown or yellowish brown.
Chewacla	Young alluvium	Moderately good to somewhat poor.	Nearly level	0–2	Brown to yellowish brown.
Congaree	Young alluvium	Good	Nearly level	0–2	Dark yellowish brown to yellowish brown.
Riverwash	Sand and gravel	Excessive	Nearly level	0–2	
Stony alluvial land	Young alluvium	Variable	Nearly level	0–2	
Wehadkee	Young alluvium	Poor	Nearly level	0–2	Gray, mottled

[1] No subsoil. [2] No surface soil.

The Catoctin soils have a light-brown silt loam surface layer and little or no subsoil development. These are shallow, excessively drained soils that occur where greenstone and granodiorite rock formations join. In most areas slopes range from 25 to 45 percent, but in a few areas slopes are as mild as 7 percent. The soils are medium in organic-matter content and in natural fertility. Loose stones and some rock outcrops are characteristic of these soils.

Made land is a miscellaneous land type that has been built up and used mainly as sites for buildings, playgrounds, picnic areas, and parking lots.

Hazel soils developed in material weathered from phyllite or a mixture of sandstone and granite. They have a brown loam surface soil and little or no subsoil development. They are excessively drained and are shallow to bedrock or decomposed rock material. They are fairly low in organic matter but are more fertile than the Louisburg soils. Normally, the Hazel soils occur where areas of arkosic sandstone and of granitic rock join. Slopes range from 7 to 45 percent.

Ramsey soils formed in the Blue Ridge Mountains in material weathered from sandstone and quartzite that was not covered by the greenstone lava flow. Most of these shallow, excessively drained soils have slopes of 14 to 45 percent. Some of them, however, are on slopes as mild as 7 percent. They have a dark-gray to pale-brown fine sandy loam surface layer and no subsoil development.

Rock land, acidic, occurs in the Blue Ridge Mountains and in steep, rough areas of the Piedmont Plateau. The rocks are granite, granodiorite, and sandstone. Rock outcrops, roughly 10 to 30 feet apart, cover 25 to 50 percent of the surface, and there are loose stones on the surface. The rocks make use of farm machinery impracticable, but the acreage has some value for forest and for pasture consisting of wild grasses.

Rock land, basic, consists entirely of greenstone rock. It is in the Blue Ridge Mountains. Slopes range from 7 to 45 percent or more. The rock outcrops, roughly 10 to 30 feet apart, cover 25 to 50 percent of the surface, and loose stones are on the surface. The rocks make use of machinery impracticable, but the acreage has some value for forest and for pasture consisting of wild grasses.

Rock outcrop is mapped in areas where more than 90 percent of the surface area is bedrock outcrops. This land type is normally steep to very steep, as it is in the mountains and on bluffs bordering streams.

Very rocky land occurs in the mountains and on bluffs along some streams. It contains greenstone, granite, granodiorite, and sandstone. In most areas slopes range from 14 to 45+ percent, although some areas have slopes as mild as 7 percent. The rock outcrops are 10 feet apart or less and cover 50 to 90 percent of the area. Loose stones are on the surface. The rocks make use of farm machinery impracticable. The acreage has little or no value for pasture and should remain in forest.

Soils of the terraces

Narrow to wide terraces border the Rappahannock, Jordan, Rush, Covington, Thornton, Hazel, and Hughes Rivers and some of the creeks in the county. In the geologic past these streams flowed at higher levels than they do now and deposited quantities of gravel, sand, silt, and clay on their flood plains. Today these streams

of the soil series—Continued

COLLUVIAL SLOPES

Surface soil—Continued		Subsoil			
Texture	Thickness	Color	Consistence	Texture	Thickness
	Inches				*Inches*
Loam	10–20	Yellowish brown to red	Friable	Sandy clay loam to silty clay loam.	18–30
Silt loam	10–15	Highly mottled	Firm to plastic	Clay to clay loam	15–36

BOTTOM LANDS

					(1)
Loamy fine sand	14–20	Light brown or yellowish brown.	Loose	Loamy fine sand	25–40
Silt loam	9–18	Mottled	Friable	Fine sandy loam to clay	18–30
Silt loam and fine sandy loam.	14–20	Brown	Very friable	Fine sandy loam	25–40
	(2)				(1)
	(2)				(1)
Silt loam	6–14	Highly mottled	Plastic	Silty clay loam to clay	24–38

and rivers have developed a new and lower flood plain, and the parts of the old flood plain that remain constitute the terraces. Some of these are high and far from the present stream channel; others are lower and closer to the present flood plain. These lower, younger terraces are often referred to as second bottoms, or benches.

The soils of the terraces in Rappahannock County are in the Altavista, Augusta, Hiwassee, Roanoke, and Wickham series. These soils differ mainly in source of parent material, color, texture, drainage, age, consistence, and geographic positon.

Altavista soils have a light yellowish-brown loam surface layer and a yellowish-brown, friable clay loam subsoil. They are well drained to moderately well drained soils that occupy low, nearly level terraces. Normally, they are slightly sticky when wet and have a mottled, gray layer below 26 inches.

Augusta soils have a light yellowish-gray surface layer and a friable clay loam subsoil that is mottled with yellow and gray. This mottled layer occurs at depths of 8 to 16 inches. These soils are moderately well drained to somewhat poorly drained, and they occupy low, nearly level terraces. They are low in content of organic matter, low in natural fertility, and strongly acid.

Hiwassee soils have a dark-brown to dark reddish-brown loam surface layer, and their thick subsoil is a dark-red, fine-textured clay that is sticky when wet. These well-drained soils are high in organic-matter content and in natural fertility. They formed in fine-textured alluvium composed mainly of silt, clay, and fine sand, which was derived mainly from basic rocks. The Hiwassee soils are medium acid to very strongly acid and are among the most productive soils in the county. They are mostly gently sloping to sloping, and are on high stream terraces.

Roanoke soils have a mottled, gray silt loam surface layer and a highly mottled plastic clay subsoil. They are poorly drained. Although these soils occupy the lowest position on the terraces, they are high enough above the flood plain to escape flooding. Water, however, may stand on the surface for some time after a heavy rain. The Roanoke soils are medium in content of organic matter, low in natural fertility, and strongly acid in reaction.

Wickham soils have a brown loam surface layer and a brown to yellowish-brown clay loam subsoil that is slightly sticky when wet. These deep, well-drained soils are fairly high in organic-matter content and in natural fertility. Slopes range from 0 to 14 percent, but the dominant slopes are 2 to 7 percent. They occupy second bottoms and are at lower elevations than Hiwassee soils.

Soils of the old colluvial slopes

Old colluvial rock and soil material that washed and rolled from the mountain slopes is fairly extensive in Rappahannock County. These areas are on low slopes, at the foot of mountains, in old colluvial fans, in mountain hollows, and in gaps. For the most part, this material has lain in place long enough for development of deep soils with well-defined profiles. The soils of the old colluvial slopes are members of the Dyke and Unison series; two miscellaneous land types—Stony colluvial land and Stony local alluvial land—also are included.

Dyke soils have a reddish-brown loam surface layer and a dark-red clay subsoil that is slightly sticky when wet. These deep, well-drained soils are high in content of organic matter and in natural fertility and are medium acid to slightly acid. Slopes range from 2 to 25 percent, but the dominant slopes are 2 to 14 percent. These are among the most productive soils in the county.

Stony colluvial land occurs in mountain hollows and along drainageways. Stones cover more than 90 percent of the surface.

Stony local alluvial land occurs throughout the mountains, along the base of mountain hollows and gaps. Most of this land type has formed in granodiorite, but in the northwestern part of the county it overlies mixed greenstone and granodiorite. The surface layer is dark-brown loam, and the subsoil is a yellowish-brown, weakly developed sandy clay loam. This land is well drained, deep, moderately high in content of organic matter, and moderately high in natural fertility. It is medium acid to strongly acid. Slopes range from 2 to 25 percent.

Unison soils have a dark-brown loam surface layer and a reddish-brown clay loam subsoil. These deep, well-drained soils are moderately high in content of organic matter and in natural fertility and are medium acid. Slopes range from 2 to 25 percent, but the dominant slopes are 2 to 14 percent. These are among the most productive soils in the county.

Some of the Unison soils are cobbly loams, which have rounded or partially rounded fragments of rock 3 to 10 inches in diameter on the surface and throughout the profile. Others of silt loam texture have a fragipan at depths of 18 to 26 inches.

Soils of the recent colluvial slopes

On recent colluvial slopes there are local deposits of soil material that washed and sloughed down from the adjoining upland. The accumulation of sand, silt, and clay is at the base of slopes, along small drains, and in depressions in the uplands where erosion has been active on the slopes above. The soils in this topographic positon are of the Meadowville and Worsham series. From the mountain foothills eastward, they occur in all parts of the county. The Meadowville soils are more extensive than the Worsham.

Meadowville soils are gently sloping. They have a dark-brown to reddish-brown loam surface layer and a yellowish-brown to red subsoil. They are moderately well drained to well drained, are high in content of organic matter and in natural fertility, and are medium acid to slightly acid.

Worsham soils have a mottled, grayish-brown, gray, and yellow silt loam surface layer and a highly mottled, gray and yellowish-brown, plastic clay subsoil. These soils are poorly drained and nearly level to gently sloping. They are medium in content of organic matter and low in natural fertility. Water stands on the surface for some time after a heavy rain. Stones, 2½ feet or less apart, cover about 15 to 90 percent of the surface of Worsham stony silt loam. Use of farm machinery is not practicable.

Soils of the bottom lands

The bottom lands are flood plains or nearly level areas along streams that are flooded periodically. Soils of the bottom lands form in material carried down and deposited by the streams. Their character depends mostly on the source of the material and the rate at which the water was moving when the material was deposited. The material has not lain in place long enough to allow formation of a well-defined surface layer and subsoil such as occur in most soils of the uplands, terraces, and old colluvial lands. The soils of the bottom lands are of the Buncombe, Chewacla, Congaree, and Wehadkee series; also, there are three miscellaneous land types—Alluvial land, Riverwash, and Stony alluvial land.

Alluvial land has variable texture and drainage. The texture ranges from silt loam to loam, fine sandy loam, or loamy fine sand, and the drainage ranges from good to poor.

Buncombe soils are excessively drained and predominantly light brown throughout the profile. Their texture is loamy fine sand in the upper part of the profile. These nearly level soils are low in content of organic matter and in natural fertility and are strongly acid.

Chewacla soils are imperfectly drained to moderately well drained. Their surface layer resembles that of the Congaree soils, but numerous mottles occur below a depth of 18 inches. These nearly level soils are medium in content of organic matter and in natural fertility and are normally medium acid to strongly acid. The water table is fairly high but can be lowered through tile drainage.

Congaree soils are well drained, predominantly brown throughout the profile, and normally somewhat micaceous. They are high in content of organic matter and in natural fertility and are medium acid to strongly acid. They are nearly level.

Riverwash is a miscellaneous land type that occurs along some of the large streams. The streams have overflowed or cut away the soils and left beds of sand and gravel. This land supports little or no vegetation and is of little agricultural value.

Stony alluvial land is a miscellaneous land type. It is like Alluvial land and is in areas close to the mountains but is not overflowed so often as Alluvial land.

Wehadkee soils are nearly level, gray, poorly drained, deep soils of the first bottoms. They formed in alluvial material that washed from soils of the Piedmont Plateau. They have a mottled silt loam surface layer and a highly mottled silty clay to clay subsoil. These soils are used mostly for pasture.

Descriptions of Soils

In the following pages the soil series of Rappahannock County, Va., are described in alphabetic order. Following the description of each series is a description of the mapping units in that series. The first mapping unit described is the one considered most typical of the series. Other mapping units are then described by pointing out how they differ from the first unit. A detailed description of a soil profile is given in the first mapping

unit. The reader is to assume that all other mapping units in the series have essentially the same kind of profile. Differences in the profiles, if any, are stated in the text.

In the profile description some terms are used that may not be familiar to the general reader. The upper layer, or surface soil, is the A horizon. This layer has had some of its clay and soluble minerals washed by water into the layer below. The depth and thickness of each horizon are indicated by measurement from the surface downward.

The subsoil, or B horizon, contains clay and other minerals that were washed from the A horizon. It is sometimes divided in B_1, B_2, and B_3 layers. In most places, the soil formed from material similar to that which underlies the B horizon. This is called the C horizon.

In this report color is denoted both by a descriptive term, such as grayish brown, and by Munsell notations, such as 10YR 5/2. The Munsell notations are precise symbols that denote hue, value, and chroma.

Other terms, such as texture, structure, and consistence, as well as methods of mapping soils, are described in the section, Soil Survey Methods and Definitions. Soil terms also may be found in the Glossary. The approximate acreage and proportionate extent of the soils are given in table 4. The location and distribution of the mapping units are shown on the soil map at the back of this report.

TABLE 4.—*Approximate acreage and proportionate extent of soils*

Soil	Area	Extent
	Acres	*Percent*
Albemarle fine sandy loam:		
Gently sloping phase	1, 179	0. 7
Sloping phase	2, 139	1. 2
Alluvial land	1, 611	. 9
Altavista loam	141	. 1
Augusta silt loam	342	. 2
Belvoir loam	1, 141	. 7
Brandywine gritty loam:		
Gently sloping phase	2, 273	1. 3
Sloping phase	3, 454	2. 0
Moderately steep phase	1, 894	1. 1
Brandywine loam:		
Sloping phase	7, 422	4. 3
Moderately steep phase	9, 922	5. 8
Steep phase	3, 800	2. 2
Brandywine rocky loam:		
Sloping phase	990	. 6
Moderately steep phase	2, 910	1. 7
Steep phase	1, 448	. 8
Brandywine silt loam:		
Eroded sloping phase	621	. 4
Eroded moderately steep phase	465	. 3
Brandywine stony loam:		
Sloping phase	1, 709	1. 0
Moderately steep phase	5, 223	3. 1
Steep phase	7, 954	4. 7
Buncombe loamy fine sand	383	. 2
Catoctin stony silt loam, steep phase	188	. 1
Chester loam:		
Gently sloping phase	874	. 5
Eroded sloping phase	697	. 4
Chester-Brandywine loams:		
Eroded gently sloping phases	488	. 3
Eroded sloping phases	3, 522	2. 1
Chewacla silt loam	2, 192	1. 3
Congaree fine sandy loam	777	. 4
Culpeper clay loam:		
Severely eroded sloping phase	1, 068	. 6
Severely eroded moderately steep phase	304	. 2
Culpeper loam:		
Gently sloping phase	1, 650	1. 0
Eroded sloping phase	3, 001	1. 8
Dyke loam:		
Gently sloping phase	443	. 3
Eroded sloping phase	328	. 2
Eubanks-Brandywine complex:		
Sloping phases	5, 220	3. 1
Eroded moderately steep phases	1, 462	. 9
Eubanks-Chester complex:		
Gently sloping phases	445	. 3
Sloping phases	737	. 4
Eubanks and Lloyd clay loams:		
Severely eroded gently sloping phases	269	0. 2
Severely eroded sloping phases	2, 134	1. 2
Severely eroded moderately steep phases	593	. 3
Eubanks and Lloyd loams:		
Gently sloping phases	1, 456	. 8
Eroded sloping phases	2, 493	1. 5
Eubanks and Lloyd stony loams, eroded moderately steep phases	525	. 3
Halewood stony fine sandy loam:		
Sloping phase	366	. 2
Moderately steep phase	543	. 3
Steep phase	1, 748	1. 0
Hazel loam:		
Sloping phase	1, 215	. 7
Moderately steep phase	2, 444	1. 4
Steep phase	785	. 5
Hazel stony loam:		
Moderately steep phase	435	. 2
Steep phase	662	. 4
Hiwassee clay loam:		
Severely eroded gently sloping phase	139	. 1
Severely eroded sloping phase	613	. 4
Hiwassee loam:		
Gently sloping phase	607	. 4
Sloping phase	267	. 2
Louisburg sandy loam:		
Sloping phase	1, 491	. 9
Moderately steep phase	2, 701	1. 6
Louisburg soils, steep phases	1, 868	1. 1
Louisburg stony sandy loam:		
Sloping phase	481	. 3
Moderately steep phase	1, 556	. 9
Made land	17	(1)
Meadowville loam	5, 505	3. 2
Myersville stony silt loam:		
Sloping high phase	632	. 4
Moderately steep high phase	410	. 2
Porters stony loam:		
Gently sloping phase	128	. 1
Sloping phase	888	. 5
Moderately steep phase	1, 007	. 6
Steep phase	2, 891	1. 7
Ramsey stony fine sandy loam, steep phase	319	. 2
Riverwash	175	. 1
Roanoke silt loam	124	. 1
Rock land, acidic:		
Moderately steep phase	3, 036	1. 8
Steep phase	16, 767	9. 8

See footnote at end of table.

TABLE 4.—*Approximate acreage and proportionate extent of soils*—Continued

Soil	Area	Extent	Soil	Area	Extent
	Acres	*Percent*		*Acres*	*Percent*
Rock land, basic:			Unison loam:		
Moderately steep phase	3, 271	1. 9	Gently sloping phase	493	0. 3
Steep phase	2, 592	1. 5	Eroded sloping phase	312	. 2
Rock outcrop	181	. 1	Gently sloping fragipan variant	200	. 1
Stony alluvial land	1, 942	1. 1	Very rocky land	14, 085	8. 2
Stony colluvial land	1, 068	. 6	Wehadkee silt loam	425	. 2
Stony local alluvial land:			Wickham loam, gently sloping phase	392	. 2
Gently sloping phase	892	. 5	Worsham silt loam	2, 059	1. 2
Sloping phase	2, 869	1. 7	Worsham stony silt loam	359	. 2
Moderately steep phase	1, 289	. 7			
Unison cobbly loam:			Total	170, 880	100. 0
Gently sloping phase	282	. 2			
Sloping phase	462	. 3			

[1] Less than 0.1 percent.

Albemarle series

The Albemarle series consists of sloping to gently sloping, light-colored, well-drained, moderately deep soils of the uplands. The soils formed in material weathered from arkosic sandstone, quartzite, and phyllite. The surface soil is grayish-brown fine sandy loam, and the subsoil is yellowish-red, friable clay loam. The soils are strongly acid. They are low in organic-matter content and in fertility. Tilth is good, and the soils are easy to conserve.

The Albemarle soils are inextensive and are mostly in the eastern part of the county. Associated with them are the Culpeper and Louisburg soils, which they resemble in mode of formation and in kind of parent material. The Albemarle soils differ from the Culpeper soils in having a yellowish-red, thinner subsoil that contains less clay. They differ from the Louisburg soils in having a well-developed profile.

The natural vegetation on the Albemarle soils consists of white oak, scarlet oak, red oak, chestnut oak, black oak, hickory, blackgum, shortleaf pine, white pine, and Virginia pine. The Albemarle soils are used mostly for pasture and forest. Some areas are used for corn, small grains, and hay; however, the soils are only fair for crops commonly grown in the county.

Albemarle fine sandy loam, gently sloping phase (2 to 7 percent slopes) (AbB).—The following describes a profile under old hardwood forest, 1¼ miles east of Rock Mills, and 200 yards south of State Highway No. 622:

A_0 ½ to 0 inch, leaf mold.

A_1 0 to 1 inch, very dark gray (10YR 3/1),[1] very friable fine sandy loam; weak, fine, granular structure; few coarse grains of sand; few blue and milky grains of quartz sand; clear, smooth boundary.

A_2 1 to 11 inches, brown (10YR 5/3), very friable fine sandy loam; weak, fine, granular structure; few bleached and blue grains of quartz sand; clear, smooth boundary.

B_1 11 to 14 inches, yellowish-brown (10YR 5/4), friable sandy clay loam; weak, fine, subangular blocky structure; few patchy clay films; few fine, gravel-size, blue and white fragments of quartz; clear, smooth boundary.

B_2 14 to 28 inches, yellowish-red (5YR 5/6), friable clay loam; moderate, medium, subangular blocky structure; common coarse, blue and white grains of quartz sand; few fragments of sandstone; common fine mica flakes; few distinct clay films; clear, smooth boundary.

B_3 28 to 37 inches, strong-brown (7.5YR 5/6), friable, light sandy clay loam; moderate, medium, angular blocky structure; many weathered fragments of sandstone; clear, smooth boundary.

C_1 37 to 45 inches, highly weathered, grayish arkosic sandstone material mixed with some soil material.

The surface soil, where not eroded, is 8 to 12 inches thick. Where eroded, as in most cultivated fields, it is 6 to 8 inches thick. Here the thin A_0 and A_1 horizons have been mixed with the A_2 horizon, and their identity is lost. The surface layer in cultivated fields, when moist, ranges from light yellowish brown to yellowish brown; when dry, it is light gray.

The subsoil is 20 to 39 inches thick. The B_2 horizon is yellowish red to yellowish brown, and, when dry, it is somewhat lighter colored. The B_3 horizon ranges from strong brown to yellowish red and has a few mottles of gray. This layer, in places, is slightly compact when dry. Somewhat rounded quartz gravel is on the surface and embedded in the solum in some areas. These areas are along the contact zone between Marshall granite and arkosic sandstone and are indicated on the map by gravel symbols. Small areas of Culpeper and Louisburg soils are included in places on the nearly level parts of ridgetops.

Albemarle fine sandy loam, gently sloping phase, is moderate in permeability. Organic matter and natural fertility are low. The soil is normally strongly acid and is medium to low in its ability to retain applied lime and plant nutrients. The moisture-supplying capacity is medium. Tilth is good, and the soil is easy to work within a wide range of moisture content. The soil is commonly droughty late in summer.

Use and suitability.—Approximately 50 percent of this soil is in pasture, 20 percent is in crops, and 30 percent is in forest. The soil is best suited to lespedeza and to small grains, although, with good management, it is fairly well suited to most crops commonly grown in the county. (Capability unit IIe-3.)

Albemarle fine sandy loam, sloping phase (7 to 14 percent slopes) (AbC).—This soil has steeper slopes and a slightly thinner surface soil and subsoil than Albemarle fine sandy loam, gently sloping phase. Some of the surface soil has been removed through accelerated

[1] The Munsell notations are for colors of moist soil unless otherwise specified.

erosion in cultivated fields. Here, small spots where the subsoil is exposed are common. The subsoil, in general, is thinner than that of the gently sloping phase; it ranges from about 8 to 20 inches in thickness. There are a few shallow gullies and rock outcrops. A few small areas of Louisburg soils occur, especially adjacent to the outcrops.

Use and suitability.—Approximately 60 percent of this soil is in forest, 15 percent is in crops, and 25 percent is in pasture. Strong slopes, great erosion hazard, and a thin solum greatly limit the use of this soil for cultivated crops. Pasture crops are better suited. (Capability unit IIIe-3.)

Alluvial land

Alluvial land (0 to 2 percent slopes) (Ad).—This is a miscellaneous land type that consists of light-colored, moderately deep soil materials on first bottoms. This recent, mixed alluvial material washed from the Piedmont Plateau and from the adjacent mountains. There is no definite profile development, and the land is normally medium acid and low in organic-matter content and in natural fertility.

This land type is in nearly level areas along the large streams. Associated with it are Congaree, Wehadkee, and Chewacla soils. Alluvial land differs from those soils in having mixed texture and variable drainage.

The natural vegetation consists of sycamore, willow, elm, boxelder, and oak trees. Alluvial land is used largely for forest and pasture. It has good to poor tilth and is easy to conserve, but yields of crops are poor.

The texture in this land type varies widely because of differences in texture of the soils from which it washed and because of differences in the volume of flow in the streams at the time the material was deposited. Locally, the texture varies from silt loam to sand. This land is frequently overflowed and thus receives new material. The land is well drained to poorly drained. The surface layer varies between light brown and grayish brown.

Included in this land type are small areas of Chewacla and Wehadkee soils. Also included are Congaree soils on which thin bars of sand and gravel have been deposited and areas containing shallow channels that were cut by the streams during floods.

The permeability in Alluvial land is very rapid to slow. The content of organic matter and the natural fertilty are low. The land is normally strongly acid and is low in ability to retain fertility gained by adding lime and fertilizer. In capacity to absorb and retain moisture for plants, this land type is good to poor. Tilth is good to poor.

Use and suitability.—Approximately 50 percent of Alluvial land is in pasture, 30 percent is in crops, and 20 percent is in forest. It is best used for pasture or forest. It can be used for some field crops if it is properly drained, is protected from floods, and is otherwise carefully managed. (Capability unit IIIw-1.)

Altavista series

The Altavista series consists of nearly level to gently sloping, yellow, well drained to moderately well drained, moderately deep soils of the terraces. They formed in materials washed from the soils of the Piedmont Plateau and from adjacent mountains. The surface soil is light yellowish-brown loam, and the subsoil is yellowish-brown, friable clay loam. The soils are strongly acid. They are medium in organic-matter content and in fertility. They have good tilth and are easy to conserve.

The Altavista soils are inextensive and occur only along the large streams. They are associated with the Wickham, Augusta, and Roanoke soils, which they resemble in mode of formation and in kind of parent material. The Altavista soils differ from the Wickham soils in having a yellower subsoil and in being less well drained. They differ from the Augusta soils in texture of the surface soil and in being better drained.

The natural vegetation consists of white oak, post oak, red oak, elm, maple, sweetgum, and some pine. Most of the acreage has been cleared and is used for crops and pasture.

Altavista loam (0 to 7 percent slopes) (At).—The following describes a profile in an old hayfield containing wild grasses, timothy, and lespedeza, 650 yards north of the junction of State Highways 618 and 231 in the F.T. valley:

- A_p 0 to 8 inches, dark grayish-brown (10YR 4/2), very friable loam, with patches of dark yellowish brown (10YR 4/4); moderate, fine, granular structure; many fine roots; clear, smooth boundary.
- B_1 8 to 13 inches, yellowish-brown (10YR 5/4), friable, light clay loam; weak, fine, subangular blocky structure; few fine roots; few patchy clay films; few coarse grains of sand; slightly sticky when wet; clear, smooth boundary.
- B_{21} 13 to 18 inches, yellowish-brown (10YR 5/6), friable silty clay loam; weak, fine, subangular blocky structure; few fine roots; few patchy clay films; few rounded quartz pebbles; slightly sticky when wet; clear, smooth boundary.
- B_{22} 18 to 30 inches, yellowish-brown (10YR 5/4), friable to firm clay loam with mottles of brown (10YR 5/3) and gray (10YR 5/1); moderate, medium, subangular blocky structure; common, distinct mottlings; gray mottling becomes more prominent below 24 inches; distinct, continuous clay films; few rounded quartz pebbles and grains of sand; gradual, wavy boundary.
- C_1 30 to 36 inches +, grayish-brown (10YR 5/2), friable sandy clay loam, with rock fragments up to 4 inches in diameter.

The surface soil ranges from 8 to 14 inches in thickness and from dark grayish brown to light yellowish brown in color. In most of the cultivated fields, the surface soil is light yellowish brown. Because of the accumulation of organic matter where the soil has not been worked for a long time, the surface soil, in some areas, has a darker color. This soil has eroded very little and has a deep surface layer.

The subsoil commonly is yellowish brown, and its texture ranges from silty clay loam to clay loam. Where most of the soil material was washed from greenstone rock, a few areas have a clay subsoil. The B horizon is generally mottled. A few small spots of Augusta and Wickham soils are included. Some areas near the mountainous part of the county have a cobbly layer. Because of their small acreage, areas with slopes of 2 to 7 percent are included with Altavista loam.

Permeability in the soil is moderate. The content of organic matter and the natural fertility are medium. The soil is strongly acid. The surface soil is moderately permeable to roots, moisture, and air. Surface runoff is slow to medium, depending on slope, and the water-

holding capacity is high. The soil has fair tilth and is easy to conserve.

Use and suitability.—Approximately 60 percent of this soil is in crops, and 40 percent is in pasture. The soil is best suited to corn, hay, pasture, small grains, and truck crops. Alfalfa can be grown, but because of poor internal drainage, the soil is not well suited to it. Stands are good at first planting, but they die out within a few years. (Capability unit IIw-2.)

Augusta series

The Augusta series consists of nearly level to gently sloping, moderately well drained to somewhat poorly drained, moderately deep soils of the terraces. They formed in material washed from the soils of the Piedmont Plateau and from adjacent mountains. The surface soil is grayish-brown silt loam. The subsoil is light olive brown and grayish-brown, slightly sticky clay loam to silty clay loam that is mottled with light gray and yellowish brown. These soils are strongly acid. Their organic-matter content is medium to low, and their fertility is medium. These soils have fairly good tilth when moisture content is optimum. Because they are somewhat poorly drained in places, however, the optimum moisture range is narrow.

The Augusta soils are inextensive and are only on the terrace benches along the large streams. They are associated with the Altavista and Roanoke soils. They are similar to these soils in mode of formation and in kind of parent material. The Augusta soils differ from the Altavista soils in being less well drained and in having less distinct color in the horizons. They are similar to the Roanoke soils in texture, but they are better drained.

The natural vegetation consists of post oak, water oak, maple, blackgum, sweetgum, and some pine. The acreage is used mostly for hay and pasture. Small areas are planted to corn.

Augusta silt loam (0 to 7 percent slopes) (Au).—The following describes a profile in an old hayfield consisting of wild grasses, timothy, and lespedeza, 600 yards northwest of the junction of State Highways 618 and 231, along Highway 231:

- A_p 0 to 11 inches, dark grayish-brown (2.5Y 4/2), very friable silt loam; weak, fine, granular structure; few fine and medium roots; clear, smooth boundary.
- B_1 11 to 15 inches, grayish-brown (2.5Y 5/2), friable, light clay loam; few, distinct mottlings of yellowish brown (10YR 5/4); weak, fine, subangular blocky structure; few fine roots; few rounded quartz pebbles and grains of sand; gradual, smooth boundary.
- B_2 15 to 26 inches, light olive-brown (2.5Y 5/4), friable silty clay loam, with mottles of yellowish brown (10YR 5/4); moderate, medium, subangular blocky structure; patchy clay films; slightly sticky and slightly plastic when wet; many, distinct mottlings; gradual, wavy boundary.
- B_3 26 to 39 inches, gray (2.5Y 5/0), friable sandy clay loam, with mottles of strong brown (7.5YR 5/6); contains pockets of clay; weak, medium, subangular blocky structure; patchy clay films; few rounded quartz pebbles; gradual, wavy boundary.
- C_1 39 to 54 inches, highly weathered soil material colored with yellow, brown, and gray; contains weathered rock and pebbles up to 8 inches in diameter.

The surface soil is 8 to 12 inches deep, and very little erosion has occurred. In most of the cultivated fields where short crop rotations are used, the surface soil is lighter in color because the supply of organic matter has been depleted. Most of this soil has been bedded and cropped, and this has changed its color. The high points in the beds are lighter colored than the low points. Also, some of the low points are mottled, but there is no mottling on the high points.

The depth to the mottled B horizon ranges from 6 to 18 inches. The texture of the subsoil is clay loam to silty clay loam. Where all the material was washed from basic rocks, some areas have a clay subsoil. A few small areas have rounded gravel on the surface, but this does not interfere with cultivation. The areas that lie close to the mountains have a layer of cobbles at a depth of 36 inches. This material helps drain the soil, and more air and water can penetrate. The B horizon in this layer has more yellow and fewer gray mottles than the normal soil. Small spots of Roanoke and Altavista soils and areas of Augusta loam on slopes of 2 to 7 percent are included with Augusta silt loam.

The permeability of Augusta silt loam is moderately slow. The content of organic matter is medium to low, and the natural fertility is medium. Surface runoff is slow, and the water-holding capacity is medium. The soil is strongly acid. It is fairly easy to work and to conserve. Yields are medium to low.

Use and suitability.—Approximately 60 percent of this soil is used for hay and cropland, and 40 percent is used for pasture and woodland. It is best suited to pasture, but corn, small grains, and hay can be produced under a good management system. (Capability unit IIIw-2.)

Belvoir series

The Belvoir series consists of gently sloping, brown, moderately well drained to somewhat poorly drained, moderately deep soils of the uplands. They formed from weathered granitic material. They have a brown loam surface soil and a yellowish-brown, friable to firm silty clay loam subsoil that is highly mottled with gray and pale brown. The soils are medium acid to strongly acid. Their organic-matter content and fertility are medium to low. They have good tilth and are fairly easy to conserve.

The Belvoir soils are inextensive and have developed on upland flats and in small depressions. Associated with them are the Chester, Brandywine, and Worsham soils. They resemble these soils in mode of formation and in kind of parent material. The Belvoir soils are less well drained than the Chester soils because they have a fragipan in the lower B horizon. They are better drained than the Worsham soils and have more distinct color horizons.

The natural vegetation on the Belvoir soils consists of maple, beech, elm, pin oak, and other water-tolerant trees. The soils are used mostly for pasture and crops. They are suited to corn, small grains, and hay, but not to alfalfa. They are only fair for the crops commonly grown in the county.

Belvoir loam (2 to 7 percent slopes) (Be).—The following describes a profile in a pasture containing bluegrass and whiteclover, ½ mile south of Ben Venue along State Highway 729:

- A_p 0 to 9 inches, dark grayish-brown (10YR 4/2), very friable loam; weak, fine, granular structure; clear, smooth boundary.

B_1 9 to 14 inches, light yellowish-brown (10YR 6/4), friable, light sandy clay loam; weak, fine to medium, subangular blocky structure; clear, smooth boundary.

B_{21m} 14 to 33 inches, yellowish-brown (10YR 5/6), friable to firm sandy clay loam hardpan, with common, distinct mottles of pale brown (10YR 6/3) and light gray (2.5Y 7/2); moderate, medium to thick, platy structure; few patchy clay skins; hard when dry and slightly sticky when wet; gradual ,wavy boundary.

B_{22m} 33 to 48 inches, light brownish-gray (2.5Y 6/2), friable to firm clay loam hardpan, with common, distinct mottles of yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6); coarse, angular blocky structure; hard when dry and slightly sticky and plastic when wet.

C_1 48 to 50 inches +, highly weathered sandy soil material in shades of white, gray, and brown; many partly weathered fragments of granodiorite.

The thickness of the surface soil ranges from 6 inches on the upland flats to 16 inches in depressions. In most of the cultivated fields, the surface soil is normally 7 inches deep. In color, the surface soil is dark grayish brown, pale yellow, or brown; in texture, it is normally loam but may be silt loam where the parent material has more bases. The color of the subsoil ranges from yellowish brown to yellowish red; the texture ranges from heavy loam, sandy clay loam, or silty clay loam to clay. Not all of this soil has the fragipan that is characteristic of the Belvoir series. In some places where the parent material is basic, however, a claypan occurs. The pans vary in thickness and in depth; normally they lie at depths of 14 to 20 inches. In some areas this soil formed partly in colluvium derived from soils of the uplands.

Included with Belvoir loam are spots of Worsham silt loam and of Chester loam. Because of their small acreage, areas of moderately eroded Belvoir loam on slopes of 7 to 14 percent are included.

The permeability of Belvoir loam is slow. The soil is strongly acid. It is fairly low in organic matter and in natural fertility. The water-holding capacity is low to moderately low, but the soil retains added plant nutrients well. This soil is fairly difficult to cultivate but is easy to conserve. It remains wet for long periods after rainy seasons and is, therefore, difficult to till and to cross with heavy farm machinery.

Use and suitability.—Approximately 40 percent of this soil is in pasture, 30 percent is in crops, 25 percent is in forest, and 5 percent is idle. The soil is used mainly for corn, small grains, hay, and pasture. It is well suited to hay and to such pasture crops as ladino clover, Kentucky 31 fescue, and other plants that are tolerant of high moisture content. (Capability unit IIIw-2.)

Brandywine series

The Brandywine series consists of gently sloping to steep, brown, somewhat excessively drained, shallow soils of the uplands. They formed in material weathered from granite and granodiorite. These soils have a surface layer of brown to dark-brown loam, silt loam, or gritty loam and have little or no subsoil development. They are medium acid to very strongly acid. Their organic-matter content and fertility are medium. Tilth is good, and the soils are fairly easy to conserve.

The Brandywine soils, the most extensive in the county, occur in a large belt that extends across the county from northeast to southwest. Associated with them are the Eubanks, Lloyd, and Chester soils, which they resemble in mode of formation and in kind of parent material. Brandywine soils differ from Eubanks and Lloyd soils in having a less red color, lower content of clay, and little or no subsoil development. They are similar to the Chester soils in color and in texture, but they have a shallower profile and a weaker profile development.

The natural vegetation consists of white oak, red oak, scarlet oak, chestnut oak, yellow-poplar, chestnut sprouts, dogwood, scrub pine, and white pine. The soils are used mostly for pasture, fruit trees, and forest. Some areas are used for corn, small grains, and hay. These soils are only fair for the crops commonly grown.

Brandywine loam, moderately steep phase (14 to 25 percent slopes) (BoD).—The following describes a profile in an idle pasture, 2¼ miles east of U. S. Highway No. 522, along State Highway 637:

A_1 0 to 3 inches, very dark grayish-brown (10YR 3/2), very friable loam; weak, fine, granular structure; abundant fine roots; few fine and coarse pebbles; clear, smooth boundary.

A_2 3 to 10 inches, brown to dark-brown (10YR 4/3), very friable loam; weak, fine, granular structure; few fine roots; few fine and coarse pebbles; gradual, wavy boundary.

B_2 10 to 14 inches, dark yellowish-brown (10YR 4/4), very friable, light sandy clay loam; weak, fine, subangular blocky structure; few fine roots; few fine and coarse gravel fragments; clear, wavy boundary.

C_1 14 to 20 inches, dark yellowish-brown and reddish-brown, very friable sandy loam; weak, fine, granular structure; few weathered rock fragments.

C_2 20 to 38 inches, brown, yellow, and reddish-yellow, highly weathered, granitic rock material, easy to dig out; material retains structure of the rock.

In areas where accelerated erosion has not been active, the surface soil is 10 to 18 inches deep. In wooded areas and in some of the old orchards, this soil has developed an A_0 horizon. Where this horizon has developed, the color is much darker than that of the A_1 horizon because there is more organic matter. The B horizon does not always occur in this soil, but, if present, it is 1 to 4 inches thick.

A few shallow gullies occur locally where erosion has taken place. In some places where this soil has been cropped, the surface soil ranges from 6 to 10 inches in thickness. Some areas have gravel and stones on the surface and embedded in the solum. In most places this soil is underlain by thick saprolite. In some areas, however, the underlying rock is hard and does not weather deeply.

In places, small areas of Eubanks, Lloyd, and Chester soils are included with Brandywine loam, moderately steep phase. The Lloyd or Eubanks inclusions are redder than the Brandywine soils and are heavier in texture. In places many rock outcrops occur and are indicated on the map by symbols. Around these rock outcrops the soil is very shallow and is more sandy than normal. Small areas of silt loam and fine sandy loam are included with Brandywine loam, moderately steep phase.

Brandywine loam, moderately steep phase, has rapid permeability. The soil is medium in its content of organic matter and in natural fertility. It is porous and friable and permits easy penetration of plant roots, free movement of air and water, and rapid internal drainage. The capacity to absorb and retain moisture for

Figure 5.—**Hereford steers grazing Brandywine loam, moderately steep phase, in background and Meadowville loam in foreground.**

plants is medium. The soil is normally medium acid to strongly acid. Tilth is good, and the soil is easy to work within a wide range of moisture content.

Use and suitability.—Approximately 60 percent of this soil is in pasture, 10 percent is in crops, and 30 percent is in forest. The soil is best suited to pasture, apple trees, and forest. Figure 5 shows a pasture of mixed bluegrass and whiteclover on this soil. Steep slopes, a shallow profile, and the susceptibility to erosion when cropped limit the use of this soil for cultivated crops. (Capability unit VIe-2.)

Brandywine loam, sloping phase (7 to 14 percent slopes) (BoC).—This soil differs from Brandywine loam, moderately steep phase, in occupying smoother slopes on ridgetops and in being near the foot of stronger slopes. It has a deeper surface soil in places; in areas where more crops have been grown, however, the soil is more eroded. This soil has fewer stones and rock outcrops than the moderately steep phase. Some gently sloping areas too small to map separately are included with this soil.

Use and suitability.—Approximately 80 percent of this soil has been cleared and is used for pasture, apple trees, and field crops. The soil is more suited to crops than Brandywine loam, moderately steep phase. It retains more moisture and is less affected by excessive runoff and erosion. It is more accessible to farm machinery and is suited to more crops. Crops on Brandywine loam, sloping phase, withstand short, dry spells but are damaged during long droughts. (Capability unit IVe-2.)

Brandywine loam, steep phase (25 to 45+ percent slopes) (BoE).—This soil has a slightly thinner profile than Brandywine loam, moderately steep phase. More stones and rock outcrops occur. In most places the thin B horizon does not develop in Brandywine loam, steep phase. Some very steep areas too small to map separately are included with this soil.

Use and suitability.—Approximately 65 percent of this soil is in forest, 30 percent is in pasture, and 5 percent is in orchards. This soil is not suited to cultivated crops, because of steepness, very rapid runoff, droughtiness, and poor accessibility to farm machinery. It is moderately well suited to permanent pasture and is best suited to forest. (Capability unit VIIe-1.)

Brandywine gritty loam, gently sloping phase (2 to 7 percent slopes) (BgB).—The following describes a profile under hardwood forest, ¼ mile west of the junction of State Highways 729 and 622, along Highway 622:

- A_0 1 to 0 inch, very dark grayish-brown (10YR 3/2), decayed leaf material.
- A_1 0 to 3 inches, dark yellowish-brown (10YR 4/4), very friable gritty loam; weak, fine, granular structure; few small roots; numerous gritty particles; clear, smooth boundary.
- A_2 3 to 12 inches, dark-brown (7.5YR 4/4), very friable, very gritty fine sandy loam; weak, fine, granular structure; numerous gritty particles; many small rock fragments; gradual, smooth boundary.
- C_1 12 to 16 inches +, highly weathered rock material, with streaks of brown, yellowish brown, and black; material has structure of the rock.

This soil formed from Old Rag granite, which is a coarse-textured rock high in quartz. The rock weathers down and leaves small quartz fragments that make the soil gritty.

The surface soil of Brandywine gritty loam, gently sloping phase, varies between 6 and 18 inches in thickness. It also varies in color of the surface soil and in content of gritty fragments of quartz. The surface soil is much lighter in cultivated fields and in pastures. The A_0 and A_1 horizons have been mixed and are no longer distinct. The surface soil is commonly gritty loam but in some areas is sandy loam or gritty fine sandy loam. In some fields the finer textured materials in the surface layer have washed away and the coarser quartz fragments remain. Little, if any, subsoil has developed. The rock material weathers very deeply or to depths of 4 to 12 feet and is used for road material. Small areas of recent colluvium and small areas of Brandywine loam are included.

This soil is less productive than the Brandywine loams. Its permeability is rapid. The content of organic matter and the natural fertility are low. The capacity to retain moisture and supply it to plants is low to very low. The soil is strongly acid. It is very permeable and allows easy penetration of plant roots, air, and moisture. Tilth is good and the soil is fairly easy to conserve.

Use and suitability.—Approximately 60 percent of this soil is in woods, 15 percent is in crops, and 25 percent is in pasture. This soil is best suited to pasture and forest. If used for crops, among the better suited are corn, small grains, and hay, except alfalfa. The lack of available moisture during dry summer months lowers yields. (Capability unit IVe-2.)

Brandywine gritty loam, sloping phase (7 to 14 percent slopes) (BgC).—Runoff is greater on this soil than on Brandywine gritty loam, gently sloping phase. A few shallow gullies have developed. Most of this soil has lost some of its surface layer through accelerated erosion. Some stones and gravel are on the surface, and there are a few rock outcrops.

Use and suitability.—Approximately 60 percent of this soil is in woods, 10 percent is in crops, and 30 percent is in pasture. The soil is best suited to woods and pasture. (Capability unit IVe-2.)

Brandywine gritty loam, moderately steep phase (14 to 25 percent slopes) (BgD).—This soil has a slightly thinner solum than Brandywine gritty loam, gently sloping phase. Most of the soil is affected by sheet erosion, and there are a few deep and shallow gullies. Stones and gravel occur on the surface, and there are a few scattered rock outcrops, which are shown on the map by symbols. Some areas that have slopes greater than 25 percent are included with this soil. These were too small to map separately.

Use and suitability.—Approximately 85 percent of this soil is in forest, and 15 percent is in pasture. The soil is best suited to forest. Because of shallowness, steepness, droughtiness, rapid runoff, susceptibility to erosion, and poor accessibility, this soil is not suited to cultivated crops. Permanent pasture on the soil does not grow well in dry weather. Because of the lower natural fertility and the lower moisture-holding capacity of the gritty loam soil, pastures are inferior to those on Brandywine loam, moderately steep phase. (Capability unit VIe-2.)

Brandywine rocky loam, sloping phase (7 to 14 percent slopes) (BrC).—This soil differs from Brandywine loam, moderately steep phase, mainly in having bedrock exposed to an extent that interferes with tillage. These exposed bedrock outcrops are roughly 30 to 100 feet apart and cover about 10 to 25 percent of the surface. Around the bedrock exposures, the soil is very shallow and is more sandy than normal. In places this soil has loose stones on the surface and includes a few spots of Eubanks soils or of Lloyd, Meadowville, and Chester soils. Also included are areas that have a silt loam and gritty loam surface layer and small areas of Brandywine rocky loam on slopes of 2 to 7 percent.

Use and suitability.—Approximately 60 percent of this soil is in pasture, 10 percent is in crops, and 30 percent is in forest. The soil is best suited to pasture and forest. During dry periods, yields on this droughty, shallow soil are limited. (Capability unit VIs-2.)

Brandywine rocky loam, moderately steep phase (14 to 25 percent slopes) (BrD).—Exposed bedrock outcrops, roughly 30 to 100 feet apart, cover about 10 to 25 percent of the surface of this soil. Except for steeper slopes, this soil resembles Brandywine rocky loam, sloping phase.

Use and suitability.—Approximately 55 percent of this soil is in pasture, 5 percent is in crops, and 40 percent is in forest. The soil is best suited to trees and pasture. If well managed, the pasture is good. Steepness of slope, droughtiness, shallowness, rapid runoff, susceptibility to erosion, and poor accessibility to machinery limit the use of this soil for cultivated crops. (Capability unit VIs-2.)

Brandywine rocky loam, steep phase (25+ percent slopes) (BrE).—This soil has a slightly thinner profile than Brandywine loam, moderately steep phase. It is steeper, and bedrock outcrops, roughly 30 to 100 feet apart, cover about 10 to 25 percent of the surface.

Use and suitability.—Approximately half of this soil is in pasture and half is in woods. The soil is best suited to forest. It produces low quality pasture consisting mostly of sedge, bluegrass, and briers. (Capability unit VIIs-2.)

Brandywine silt loam, eroded sloping phase (2 to 14 percent slopes) (BwC2).—The following describes a profile in a bluegrass pasture, 1 mile north of the junction of State Highways 729 and 618, along Highway 729:

- A_1 0 to 2 inches, very dark grayish-brown (10YR 3/2), very friable silt loam; moderate, medium, granular structure; many fine mica flakes; many fine roots; clear, smooth boundary.
- A_2 2 to 16 inches, dark yellowish-brown (10YR 4/4), very friable silt loam; weak, coarse, granular structure; many fine mica flakes; many fine roots; gradual, smooth boundary.
- C_1 16 to 26 inches +, highly weathered, crushed or sheared granite or granodiorite; rock is variously colored with brown, yellowish brown, white, and gray; very micaceous soil material; has greasy feel when rubbed between the fingers; deeply weathered to hard rock.

The surface soil is 4 to 18 inches deep. The color ranges from brown to dark brown, and from dark yellowish brown to a very dark grayish brown where the organic-matter content is high. The texture is silt loam; there is little or no subsoil development. This soil is susceptible to erosion and has lost from 25 to 75 percent of the surface soil. Some shallow gullies have formed on the slopes. In some of the wooded areas, an A_0 horizon has formed, and the soil has a dark color. Small areas of Brandywine loam and Chester silt loam as well as small areas with slopes of 2 to 7 percent are included. The depth to bedrock ranges from 3 to 10 feet, but the average is about 5 feet.

The permeability of this soil is rapid. The content of organic matter and the natural fertility are medium to medium low. The soil is medium acid to strongly acid. Its capacity to absorb moisture and hold it for plants is medium. The soil is easy to work, is responsive to good management, and is fairly productive. It allows free downward movement of plant roots and free movement of moisture and air throughout the profile.

Use and suitability.—Approximately 50 percent of this soil is in pasture, 40 percent is in crops, and 10 percent is in forest. It is best used for pasture and woods. If the soil is to be used for crops, intensive care should be taken to control runoff and erosion. Use a long rotation that includes legumes and grasses and a small proportion of row crops. Plant and cultivate on the contour. (Capability unit IVe-2.)

Brandywine silt loam, eroded moderately steep phase (14 to 25 percent slopes) (BwD2).—The surface layer of this soil is 4 to 10 inches deep, or thinner than that of Brandywine silt loam, eroded sloping phase. The soil has more severe runoff and accelerated erosion than the eroded sloping phase and has more coarse fragments of rock, more stones, and more rock outcrops. This moderately steep soil dries out more rapidly in periods of dry weather and is less accessible to farm machinery than Brandywine silt loam, eroded sloping phase.

Use and suitability.—Approximately 60 percent of this moderately steep soil is in pasture, 35 percent is in forest, and 5 percent is in crops. The soil is best suited to pasture, forest, and apple orchards. Because of steepness of slope, shallowness, rapid runoff, susceptibility to erosion, poor accessibility to farm machinery, and droughtiness, it is not considered suitable for crops. Careful management is needed to establish new pastures

quickly and thus decrease the hazard of erosion. (Capability unit VIe-2.)

Brandywine stony loam, sloping phase (7 to 14 percent slopes) (ByC).—This soil differs from Brandywine loam, moderately steep phase, in occupying milder slopes and in being stony. The stones are 2½ to 5 feet apart and cover 3 to 15 percent of the surface. Most of these stones can be picked up to make the soil more suitable for pasture and crops. Surface runoff is medium; internal drainage is rapid.

Use and suitability.—Approximately 50 percent of this soil is in forest, 10 percent is in crops, and 40 percent is in pasture. The soil is best suited to pasture and fruit trees. Some crops can be grown if extreme care is taken and long rotations are used. (Capability unit IVs-2.)

Brandywine stony loam, moderately steep phase (14 to 25 percent slopes) (ByD).—Stones are scattered over the surface of this soil and are embedded throughout the profile. These stones, 2½ to 5 feet apart, cover 3 to 15 percent of the surface. A few rock outcrops are shown on the map by symbols. Under cultivation, this soil is susceptible to severe erosion.

Use and suitability.—Approximately 70 percent of this soil is in forest, 20 percent is in pasture, and 10 percent is in crops. It is best suited to forest and pasture. Because of shallowness, steepness, droughtiness, stoniness, susceptibility to erosion, and poor accessibility, this soil is not suited to cultivation. (Capability unit VIs-2.)

Brandywine stony loam, steep phase (25 to 45+ percent slopes) (ByE).—This soil has a slightly thinner profile than Brandywine loam, moderately steep phase, and loose stones are scattered over the surface and throughout the profile. The stones, 2½ to 5 feet apart, cover 3 to 15 percent of the surface. There are a few rock outcrops. The soil is droughty.

Use and suitability.—Approximately 80 percent of this soil is in forest, 17 percent is in pasture, and 3 percent is in crops. This soil is not suited to crops; its best use is forest. If properly managed, pasture will grow but will be of poor quality. (Capability unit VIIs-2.)

Buncombe series

The Buncombe series consists of nearly level, sandy, light-colored, excessively drained, deep soils of the first bottoms. They formed in alluvial material washed from the soils of the Piedmont Plateau and from the adjacent mountains. The soils are loose, light-brown or yellowish-brown loamy fine sand throughout. They are strongly acid and are low in organic-matter content and in fertility. They have good tilth and are easy to conserve.

The Buncombe soils are inextensive and occur only along the Rappahannock River, Thornton River, Hazel River, Hughes River, and other large streams. Associated soils are the Congaree and Wehadkee. Buncombe soils resemble these soils in mode of formation and in kind of parent material. They differ from the Congaree soils in texture, color, productivity, and suitability for use.

The natural vegetation consists of sycamore, willow, elm, boxelder, and oak trees. Most of the acreage has been cleared and is used for pasture, corn, small grains, and hay, but yields are poor.

Buncombe loamy fine sand (0 to 2 percent slopes) (Bz).—The following describes a profile in a cornfield, ¾ mile southeast of Laurel Mills along the Thornton River:

1. 0 to 15 inches, dark yellowish-brown (10YR 4/4), very friable loamy fine sand; single grain (structureless); clear, smooth boundary.
2. 15 to 24 inches, yellowish-brown (10YR 5/4), very friable loamy fine sand; single grain (structureless); abrupt boundary.
3. 24 to 40 inches, yellowish-brown (10YR 5/6), loose, coarse sand; single grain (structureless); abrupt boundary.
4. 40 to 52 inches, dark yellowish-brown (10YR 3/4), very friable fine sandy loam; weak, fine, granular structure; gradual, smooth boundary.
5. 52 to 54 inches +, dark-brown (7.5YR 3/2), very friable fine sandy loam; weak, fine, granular structure; layer gets lighter and sandier with depth.

The color of the surface soil ranges from light brown to yellowish brown to dark yellowish brown, depending upon the amount of organic matter. Commonly the texture is loamy fine sand, but in some places it is sandy loam, very fine sandy loam, and coarse sandy loam. The sublayers are typically stratified with coarse-textured materials, which range from fine sand to fine gravel. This soil occupies almost level flood plains along the larger rivers. It is in narrow strips near the banks and in sharp bends. The soil was deposited by recent high waters and overlies Congaree fine sandy loam. A few small wet spots are included with Buncombe loamy fine sand and are shown on the map by symbols.

The permeability is very rapid. The content of organic matter and the natural fertility are low. The soil is low in its capacity to retain fertility gained by applying lime and plant nutrients. Leaching takes place rather rapidly, and the capacity to absorb and retain moisture for plants is low. In most places the soil is strongly acid. This soil has good tilth, is easy to conserve, and is easy to work within a wide range of moisture content.

Use and suitability.—Approximately 50 percent of this soil is used for corn, 40 percent for pasture, and 10 percent for forest. Susceptibility to flooding, droughtiness, and low fertility limit its use. Yields of corn, small grains, and most hay crops are low. This soil is best suited to melons, early potatoes, early garden vegetables, and other early maturing crops. If well managed, it is very good for melons. (Capability unit IIIs-2.)

Catoctin series

The Catoctin series consists of steep, light-brown, excessively drained, shallow soils of the uplands. They formed in material weathered from greenstone. The soils have a grayish-brown to yellowish-brown silt loam surface layer and have little or no subsoil development. They are medium acid. The content of organic matter and the natural fertility are medium. All of the soils are stony. They have poor tilth but are fairly easy to conserve.

The Catoctin soils are inextensive and are in the northwestern part of the county along the contact zone between the greenstone and granodiorite formations. The soils are associated with Myersville soils and with Rock land, basic. They resemble the Myersville soils in texture and in parent material but differ from them in

having no subsoil development. The Catoctin soils occur at a lower elevation than the Myersville soils and have not accumulated so much organic matter.

The natural vegetation consists of redbud, dogwood, white pine, white oak, red oak, scarlet oak, black oak, hickory, and sassafras trees. The acreage is used mostly for forest and orchards.

Catoctin stony silt loam, steep phase (25 to 45 percent slopes) (CaE).—The following describes a profile in a forest along a fire trail in the Shenandoah National Park:

- A_1 0 to 8 inches, dark grayish-brown (2.5Y 4/2), very friable stony silt loam; weak, fine, granular structure; numerous fine roots; many greenstone fragments from ½ inch to 3 inches in diameter; abrupt, smooth boundary.
- A_2 8 to 18 inches, yellowish-brown (10YR 5/6), very friable stony silt loam; moderate, fine, granular structure; many tree roots; one-third of layer is partially weathered greenstone 1 to 4 inches in diameter; gradual, wavy boundary.
- C_1 18 inches +, partly weathered greenstone rock mixed with some soil material; black coatings along cleavage planes in rocks.

The surface soil is 12 to 20 inches deep. Most of it has been cleared but, in the park area, is now growing back to forest. In some of the old fields, the surface soil is lighter in color and is 6 to 12 inches deep. In many places an A_0 horizon has developed and is generally darker than the A_1. Some of the sloping areas have a thin, weak B horizon. This horizon, if present, is a heavy silt loam of fine, subangular blocky structure; it is never more than 3 or 4 inches thick. Stones are on the surface and rock outcrops are common. Some small areas have a red color. Because they were too small to map separately, areas of Catoctin stony silt loam on gentler slopes were mapped with this steep phase.

The permeability is rapid. The content of organic matter and the natural fertility are medium. The soil is low in its capacity to retain fertility gained by applying lime and plant nutrients. In capacity to absorb and retain moisture for plants, it is medium. In most places it is medium acid. Because of the stones and steep slopes, tilth is poor.

Use and suitability.—Approximately 75 percent of this soil is in forest, 15 percent is in pasture, and 10 percent is in crops. The soil is not suited to cultivation, but, except during prolonged dry spells, it produces fair native pasture. It is best suited to forest. (Capability unit VIIs-2.)

Chester series

The Chester series consists of gently sloping and sloping, brown, well-drained, moderately deep soils of the uplands. They formed in material weathered from granite and granodiorite. The surface layer is brown to dark-brown loam or silt loam. The subsoil is strong-brown, friable silty clay loam. These soils are medium acid to very strongly acid. They have a medium amount of organic matter, and their fertility is fairly high. Tilth is good, and the soils are easy to conserve.

The Chester soils are extensive in the vicinity of Ben Venue and Flint Hill. Associated with them are Lloyd, Eubanks, Brandywine, and Belvoir soils. Chester soils differ from the Eubanks and Lloyd soils in having a browner, thinner subsoil that contains less clay. From the Brandywine soils they differ in having a well-developed profile. They are better drained than the Belvoir soils.

The natural vegetation consists of white oak, scarlet oak, red oak, chestnut oak, hickory, poplar, locust, wild cherry, white pine, and scrub pine. The soils are used mostly for crops and pasture. They are very good for the crops commonly grown in the county.

Chester loam, gently sloping phase (2 to 7 percent slopes) (CdB).—The following describes a profile in an old apple orchard containing grass, ½ mile northwest of Flint Hill:

- A_{p1} 0 to 1 inch, dark-brown (10YR 3/3), very friable loam weak, fine, granular structure; abundant fine roots; abrupt, smooth boundary.
- A_{p2} 1 to 8 inches, brown to dark-brown (10YR 4/3), friable loam; weak, fine, granular structure; plentiful small roots; abrupt, smooth boundary.
- B_1 8 to 11 inches, yellowish-brown (10YR 5/4), friable sandy clay loam; weak, fine to medium, subangular blocky structure; clear, smooth boundary.
- B_2 11 to 22 inches, strong-brown (7.5YR 5/6), friable silty clay loam; moderate, medium, subangular blocky structure; few fragments of weathered, sheared granite; few fine mica flakes; few patchy clay films; gradual, smooth boundary.
- B_3 22 to 29 inches, yellowish-brown (10YR 5/6), friable sandy clay loam; moderate, medium to fine, subangular blocky structure; few fine mica flakes; few patchy clay films; gradual, smooth boundary.
- C_1 29 to 44 inches, highly weathered, very friable granite, mixed with some soil material; shades of yellowish red, yellowish brown, and light reddish brown; no definite structure
- C_2 44 to 120 inches, highly weathered granitic material; firm in place, friable when dug out; material retains structure of the rock.

The surface soil is 8 to 14 inches deep. In wooded areas a thin A_0 horizon has developed and it is normally darker than the surface layer in cultivated areas. In some of the cultivated fields, the surface soil ranges from 6 to 10 inches in depth. The color of the B_2 horizon is commonly strong brown, but, in places, it approaches yellowish red. The subsoil ranges from 16 to 24 inches in thickness, and from silty clay loam to clay loam in texture. Some areas having loose stones on the surface and a few rock outcrops are included with Chester loam, gently sloping phase. Around the rock outcrops the soil resembles the Brandywine soils. Some spots of Eubanks or Lloyd soils are included; the subsoil in these spots is redder and heavier textured than in the profile described. Small areas that have a silt loam surface layer are also included.

Chester loam, gently sloping phase, is rapidly permeable to air and water. It is fairly high in natural fertility and is medium in organic matter. The capacity to absorb and retain moisture for plants is high. The soil in most places is medium acid to very strongly acid and fairly high in the ability to retain fertility gained by applying lime and plant nutrients. Plants readily absorb plant nutrients from this soil. Tilth is good, and the soil is easy to work within a rather wide range of moisture content.

Use and suitability.—Approximately 25 percent of this soil is in pasture, 70 percent is in crops, and 5 percent is in forest. The soil is very good for all crops

commonly grown in the county. It is excellent for hay crops and pasture. (Capability unit IIe-2.)

Chester loam, eroded sloping phase (7 to 14 percent slopes) (CdC2).—This soil has a slightly thinner surface soil and subsoil than Chester loam, gently sloping phase. Much of the surface layer has been removed through accelerated erosion, and the subsoil is exposed in many of the cultivated fields. A few shallow gullies have formed on the slopes. The surface soil ranges from 5 to 8 inches in thickness, and the subsoil, from 8 to 14 inches. This soil is more eroded than Chester loam, gently sloping phase. Small areas that have a silt loam surface soil are included.

Use and suitability.—Approximately 60 percent of this soil is in crops, 30 percent is in pasture, and 10 percent is in forest. All of the soil is suited to crops, but care should be taken to protect it from erosion. (Capability unit IIIe-2.)

Chester-Brandywine loams, eroded gently sloping phases (2 to 7 percent slopes) (CeB2).—This complex consists of small areas of the gently sloping phases of Chester loam and of Brandywine loam so intricately associated that they cannot be separated on a map of the scale used. The well-drained Chester soil makes up about 70 percent of the total area of the complex, and the somewhat excessively drained Brandywine soil, about 30 percent. These soils are similar in color and texture of the surface layer, but the Chester soil is deeper and has a well-developed B horizon. The thickness of the surface soil ranges from 6 to 18 inches in the Brandywine soil and from 5 to 10 inches in the Chester soil. The thickness of the subsoil ranges from 0 to 4 inches in the Brandywine soil and from 10 to 20 inches in the Chester soil. This complex is closely associated with the Chester and the Brandywine soils near Ben Venue and Flint Hill. A profile description for Chester loam follows the description of the Chester series, and a profile description for Brandywine loam follows the description of the Brandywine series.

Use and suitability.—Approximately 50 percent of this complex is used for crops, 40 percent is in pasture, and 10 percent is in forest. Generally, the complex is used in a long rotation consisting of corn, a small grain, and 3 years of orchardgrass. Most farmers manage this complex in the same way as Chester loam, gently sloping phase; however, because of the lower moisture-supplying capacity of the Brandywine soil, Chester-Brandywine loams, eroded gently sloping phases, is less productive. If this complex is well managed, it is well suited to most crops commonly grown. It is very susceptible to accelerated erosion, and good management is necessary. Under good management, all of this soil is suited to cultivation. (Capability unit IIe-2.)

Chester-Brandywine loams, eroded sloping phases (7 to 14 percent slopes) (CeC2).—This complex has a slightly thinner profile than Chester-Brandywine loams, eroded gently sloping phases. It is more susceptible to erosion, and, because of this, more soil has been lost. The surface soil of the Chester loam is 4 to 8 inches deep, and that of the Brandywine loam is 4 to 12 inches deep. Shallow gullies occur in this complex, but, in most places, permanent vegetation prevents gullying.

Use and suitability.—Approximately 50 percent of this complex is used for crops, 40 percent for pasture, and 10 percent for forest. If managed with extreme care, all of this complex is suited to cultivated crops and to legume-grass mixtures for hay and pasture. (Capability unit IIIe-2.)

Chewacla series

The Chewacla series consists of nearly level, brown, moderately well drained to somewhat poorly drained, deep soils of the first bottoms. They formed in alluvial material that washed from the soils of the Piedmont Plateau and from adjacent mountains. These soils have a brown to yellowish-brown silt loam surface layer and a subsoil that has mottles of yellow, light gray, and brown. The soils are medium acid to strongly acid. They are well supplied with organic matter and with plant nutrients. Tilth is good, and the soils are easy to conserve.

The Chewacla soils are extensive along the streams in the county. Associated with them are Congaree and Wehadkee soils, which they resemble in mode of formation and in kind of parent material. The Chewacla soils differ from the Wehadkee soils in color and in drainage, and they differ from the Congaree soils in being less well drained.

The natural vegetation consists of swamp hardwoods, willow, white oak, sycamore, elm, birch, red maple, boxelder, and alder. The acreage is used mostly for pasture and crops, but as it is frequently overflowed, it is only fair for crops.

Chewacla silt loam (0 to 2 percent slopes) (Ch).—The following describes a profile in a hayfield containing orchardgrass and lespedeza, ¼ mile north of the junction of State Highways 729 and 618, along Little Battle River:

1 0 to 16 inches, dark yellowish-brown (10YR 3/4), very friable silt loam; weak, fine, granular structure; clear, smooth boundary.
2 16 to 28 inches, brown (7.5YR 5/4), very friable silt loam with distinct mottles of dark grayish brown (2.5Y 4/2); weak, fine, granular structure; numerous fine mica flakes; gradual, wavy boundary.
3 28 to 43 inches +, dark grayish-brown (10YR 4/2), friable silt loam with common, distinct mottles of grayish brown (2.5Y 5/2); many small mica flakes; many black mineral films; layer often waterlogged.

This soil varies in color, texture, consistence, thickness of layers, and depth to the water table. The depth to mottling ranges from less than 8 inches to more than 18 inches from the surface. The surface soil is brown, strong brown, or dark yellowish brown. The texture of the subsoil ranges from fine sandy loam to clay, which, in places, is sticky and plastic when wet and hard when dry. This soil is mostly free of stones, but some areas close to the mountains have a layer of stone and gravel about 36 inches deep. Included with Chewacla silt loam are areas of fine sandy loam and many patches of poorly drained soils that resemble Wehadkee silt loam. Small spots of Congaree soil are also included, which are less likely to be flooded than the Chewacla soil.

The permeability is moderate to moderately slow. The content of organic matter and the natural fertility are fairly high. Surface runoff and internal drainage are slow; the water-holding capacity is moderate. This soil is medium acid to strongly acid. Tilth is excellent and

easy to maintain. The soil can be worked within a wide range of moisture content. It is accessible to heavy farm machinery except where too wet. The texture permits easy penetration of water and plant roots, but when the soil is wet, free movement of air and water is limited to the surface layer. The soil receives large amounts of surface runoff, brought down from the higher uplands by intermittent streams. It is easy to drain with tile.

Use and suitability.—Approximately 40 percent of this soil is in pasture, 40 percent is in crops, and 20 percent is in forest. Mostly because of floods and slow internal drainage, the soil is poorly suited to most of the crops commonly grown. It is well suited to permanent pasture, corn, and some hay crops but is poorly suited to small grains, alfalfa, and many vegetable crops. Some crops, however, are grown in areas of this soil that have been tile drained (fig. 6). Under common management, average yields are somewhat lower on Chewacla silt loam than on the associated Congaree soils. (Capability unit IIIw-1.)

Congaree series

The Congaree series consists of nearly level, brown, well-drained, deep soils of the first bottoms. They formed in alluvial material washed from the soils of the Piedmont Plateau and from the adjacent mountains. These soils have a dark yellowish-brown silt loam or fine sandy loam surface layer and a brown subsoil. The soils are medium acid to strongly acid. They are high in organic-matter content and in natural fertility. Tilth is good, and the soils are easy to conserve.

The Congaree soils are inextensive and occur only along the large streams in the county. Associated with them are Buncombe, Chewacla, and Wehadkee soils, which they resemble in mode of formation and in kind of parent material. They differ from the Buncombe soils in texture, color, productivity, and suitability for use. The Congaree soils differ from the Chewacla and Wehadkee soils in being better drained. Water does not remain on the surface of the Congaree soils so long after flooding.

The natural vegetation consists of swamp hardwoods and trees that are associated with soils of the uplands—yellow-poplar, black walnut, elm, sycamore, white oak, red oak, ash, beech, and boxelder. The acreage is used mostly for crops and pasture. Except for infrequent flooding, the soils are excellent for corn.

Congaree fine sandy loam (0 to 2 percent slopes) (Co).—The following describes a profile in a cornfield, 1 mile southeast of Laurel Mills, along the Thornton River:

1 0 to 8 inches, dark yellowish-brown (10YR 3/4), very friable fine sandy loam; weak, fine, granular structure; many small mica flakes; gradual, smooth boundary.

Figure 6.—Harvesting oats on Chewacla silt loam that has been tile drained and on Meadowville loam. The steeper slopes in the background are in pasture.

2 8 to 21 inches, dark yellowish-brown (10YR 3/4), very friable fine sandy loam; weak, medium, granular structure; few fine roots; many fine mica flakes; gradual, smooth boundary.
3 21 to 28 inches, brown (10YR 5/3), loose, coarse sand; single grain (structureless); abrupt, smooth boundary.
4 28 to 40 inches, dark-brown (10YR 3/3), friable silt loam; weak, coarse, granular structure; many fine mica flakes; slightly sticky when wet; clear, smooth boundary.
5 40 to 52 inches +, very dark grayish-brown (10YR 3/2), friable silt loam; weak, coarse, granular structure; few, faint mottlings at about 48 inches; water table at 52 inches.

The surface soil ranges from fine sandy loam to silt loam in texture and from dark yellowish brown to yellowish brown in color. The layers vary in thickness. All of this Congaree soil does not have the layer of coarse sand described in layer 3 of the profile. A few areas near the mountains have gravel and cobbles in the subsoil at a depth of 30 inches. This soil is well drained but includes small spots of Chewacla and Buncombe soils that are less well drained.

The permeability of this soil is rapid. The content of organic matter and the natural fertility are high. Surface runoff is slow, internal drainage is medium, and the water-holding capacity is high. Congaree fine sandy loam is medium acid to strongly acid. It has good tilth within a wide range of moisture content and is easy to conserve. This soil is subject to flooding. The texture allows easy penetration of plant roots and free movement of air.

Use and suitability.—Approximately 70 percent of this soil is in crops, 20 percent is in pasture, and 10 percent is in forest. The susceptibility to overflow somewhat limits the use of this soil, but overflows replenish the supply of organic matter and plant nutrients. The soil is well suited to intensive use for crops. It is well suited to corn and hay crops and is exceptionally well suited to truck crops. Small grains are poorly suited because they lodge and because there is the hazard of flooding. (Capability unit IIw-1.)

Culpeper series

The Culpeper series consists of gently sloping to moderately steep, light-colored, well-drained, moderately deep to deep soils of the uplands. They formed in material weathered from arkosic sandstone, quartzite, and phyllite. These soils have a dark grayish-brown loam surface layer and a red clay subsoil. They are very strongly acid. In content of organic matter and in fertility they are medium to low. Tilth is good where erosion has not been too severe, and, where slopes are not too steep, the soils are easy to conserve.

The Culpeper soils are extensive in the eastern part of the county. They occur with the Albemarle and Louisburg soils, which they resemble in mode of formation and in kind of parent material. The Culpeper soils differ from the Albemarle soils in having a redder, thicker subsoil that contains more clay. They differ from the Louisburg soils in having a well-developed profile.

The natural vegetation is hardwood forest consisting of white oak, scarlet oak, red oak, black oak, post oak, hickory, and some shortleaf pine and scrub pine. These soils are used for crops and pasture. They are fairly well suited to the crops commonly grown in the county.

Culpeper loam, gently sloping phase (2 to 7 percent slopes) (CuB).—The following describes a profile in a pasture containing orchardgrass and ladino clover, 1 mile south of Estes, along State Highway No. 729 near the county line:

A_1 0 to 1 inch, dark grayish-brown (10YR 4/2), very friable loam; weak, fine, granular structure; many fine roots; high in content of organic matter; abrupt, smooth boundary.
A_2 1 to 7 inches, brownish-yellow (10YR 6/6), very friable loam; weak, fine, granular structure; some white quartz gravel; few fine roots; clear, smooth boundary.
B_1 7 to 12 inches, reddish-yellow (7.5YR 6/8), friable sandy clay loam; weak, fine, subangular blocky structure; few fine roots; few quartz pebbles; clear, smooth boundary.
B_2 12 to 33 inches, red (2.5YR 4/8), friable clay; moderate, medium, subangular blocky structure; few fine mica flakes; distinct, continuous clay films; gradual, smooth boundary.
B_3 33 to 41 inches, reddish-yellow (7.5YR 6/8) and brownish-yellow (10YR 6/6), friable clay loam; moderate, fine, angular blocky structure; lighter colored parts are inherited from parent rock; distinct, continuous clay films; many fine mica flakes; gradual, smooth boundary.
C_1 41 to 48 inches +, red (2.5YR 4/8) and very pale brown (10YR 8/4), friable clay loam soil material showing structure of rock; some penetration of clay coating into cracks; many fine mica flakes; layer grades into arkosic sandstone, the parent rock.

The thickness of the surface soil ranges from 8 to 12 inches. In some cultivated fields, the surface soil is commonly 6 to 10 inches thick and the A_1 horizon has been so mixed with the A_2 horizon that it is no longer distinct. The surface soil is yellowish brown, grayish brown, or dark grayish brown, depending upon the content of organic matter. In some of the old wooded areas, an A_0 horizon has developed, which is darker than the surface layer in cultivated areas. The texture of the surface soil is commonly loam, but some is sandy loam.

The subsoil ranges from light red to dark red and from clay to clay loam. In some small areas, the subsoil contains enough fine mica to make it feel greasy. Small spots of Eubanks or Lloyd soils are included with Culpeper loam, gently sloping phase.

The permeability of this soil is rapid. In content of organic matter and in natural fertility, the soil is medium to low. It has a good capacity to absorb and retain moisture and to supply it to plants. The soil is normally very strongly acid. It is readily permeable to plant roots and air, has good tilth, and can be worked within a wide range of moisture content. It is easy to conserve.

Use and suitability.—Approximately 35 percent of this soil is in crops, 25 percent is in pasture, and 40 percent is in forest. All of the soil is suited to cultivation. It is fairly well suited to the crops commonly grown in the county. Figure 7 shows shocks of orchardgrass that will be threshed. Although inherently poor in fertility and low in lime, the soil has good tilth and responds well to good management, which should include control of erosion. (Capability unit IIe-2.)

Culpeper loam, eroded sloping phase (7 to 14 percent slopes) (CuC2).—This soil has a thinner surface soil and subsoil than Culpeper loam, gently sloping phase. Some of the surface soil has been removed through

Figure 7.—Shocks of orchardgrass that will be threshed for seed. The soil is Culpeper loam, gently sloping phase. Many rail fences like the one in this figure were in the county at the time of the soil survey.

accelerated erosion, and in many places the subsoil is exposed. A few shallow gullies have formed on the slopes. In cultivated fields the depth of the surface soil ranges from 4 to 6 inches, and its color is lighter than in areas not tilled. In some areas quartz rocks are strewn over the surface, but not in quantities that interfere with cultivation. Runoff is more rapid and erosion is greater on this soil than on Culpeper loam, gently sloping phase.

Use and suitability.—Approximately 40 percent of this soil is in pasture, 25 percent is in crops, and 35 percent is in forest. The soil is best suited to hay crops and permanent pasture. Nevertheless, if very carefully managed, all of it can be cultivated. Through careful control of erosion and runoff water, this soil can be made to provide as good yields as Culpeper loam, gently sloping phase. (Capability unit IIIe-2.)

Culpeper clay loam, severely eroded sloping phase (7 to 14 percent slopes) (CpC3).—This soil has lost nearly all of its surface soil through erosion. The surface layer is 0 to 4 inches thick. Where some of the original surface soil remains, it has been mixed with the subsoil to form a more reddish, finer textured surface layer. Tillage is mostly in the subsoil, which heaves in winter. There are some active, shallow gullies. Included with this soil are some severely eroded gently sloping areas.

Use and suitability.—Approximately 55 percent of this soil is in pasture, 30 percent is in crops, and 15 percent is in forest. This soil is harder to work and is less productive than Culpeper loam, gently sloping phase. Erosion has removed surface soil, organic matter, and plant nutrients and has lowered the moisture-supplying capacity. Water is poorly absorbed and runoff is rapid. The soil can be tilled only within a narrow range of moisture content. It is poorly suited to tilled crops but is well suited to pasture, some hay crops, and small grains. (Capability unit IVe-1.)

Culpeper clay loam, severely eroded moderately steep phase (14 to 25 percent slopes) (CpD3).—This soil differs from Culpeper loam, gently sloping phase, in occupying steeper slopes and in having lost nearly all of its surface soil through erosion. The surface layer, 0 to 4 inches deep, is a mixture of remnants of the original surface soil and the upper part of the subsoil. This layer is finer textured and more reddish than the original surface soil. Shallow gullies occur throughout, and, in a few areas, some deep gullies have formed. Arkosic sandstone outcrops occur in some places.

Use and suitability.—Approximately 40 percent of this soil is in pasture, 15 percent is in crops, and 45 percent is in forest. The soil is best suited to pasture and forest; it is not suited to cultivation. Care must be taken to establish a permanent sod. Once the sod is established, it produces good pasture if well managed. (Capability unit VIe-1.)

Dyke series

The Dyke series consists of gently sloping and sloping, dark-colored, well-drained, deep, colluvial soils. They developed in very old colluvial rock and soil material that washed from mountain slopes that are underlain by greenstone. These soils have a dark reddish-brown to reddish-brown surface soil and a dark-red clay subsoil. They are slightly sticky and slightly plastic when wet. The soils are medium acid to slightly acid. They are high in organic-matter content and in natural fertility. Tilth is good in the uneroded areas, and the soils are fairly easy to conserve.

The Dyke soils are extensive along the base of the mountains in the northwestern part of the county. They are associated with the Unison soils and with Stony local alluvial land. They resemble those soils in mode of formation and in parent material. The Dyke soils differ from the Unison soils in having a darker red subsoil that contains more clay.

The natural vegetation consists of white oak, red oak, scarlet oak, black oak, black walnut, black locust, yellow-poplar, dogwood, redbud, and hickory. The soils are used mostly for alfalfa, pasture, and orchards. They are among the best soils in the county for all of the crops commonly grown.

Dyke loam, gently sloping phase (2 to 7 percent slopes) (DyB).—The following describes a profile near an old, abandoned farm, west of a packing house and north of State Highway No. 630:

A_p 0 to 8 inches, dark reddish-brown (2.5YR 3/4), friable loam; moderate, medium, granular structure; abundant fine roots; a few rock fragments up to 2 inches in diameter; abrupt, smooth boundary.

B_1 8 to 18 inches, yellowish-red (5YR 4/6), friable clay loam; moderate, medium, subangular blocky structure; plentiful fine roots; few small fragments of quartz; clear, smooth boundary.

B_{21} 18 to 29 inches, dark-red (2.5YR 3/6), friable clay; moderate, medium, subangular blocky structure; few fine and medium roots; few small fragments of quartz; slightly sticky and slightly plastic when wet; few patchy clay films; gradual, smooth boundary.

B_{22} 29 to 40 inches, dark-red (2.5YR 3/6), firm clay; moderate, medium to coarse, subangular blocky structure; slightly sticky and slightly plastic when wet; common, prominent clay films; few small concretions of

manganese; few weathered fragments of greenstone rock; gradual, wavy boundary.

B_3 40 to 72 inches, dark-red (2.5YR 3/6), friable silty clay; weak, coarse to medium, angular blocky structure; slightly sticky when wet; many weathered rock fragments; few patchy clay films; clear, wavy boundary.

C_1 72 to 93 inches, strong-brown (7.5YR 5/6) silt loam from weathered rock material; prominent, fine mica flakes; material is probably a stratum deposit; clear, smooth boundary.

C_2 93 to 147 inches, weak-red (10R 4/4) and pale-olive (5Y 6/3), massive, plastic clay; material is probably a stratum deposit.

D 147 inches +, firm, weathered granitic rock material.

The surface soil ranges from 6 to 14 inches in depth and from loam to silt loam in texture. The B horizon is 30 to 80 inches in thickness and is dark red to red. In all of the profiles studied, the B_2 horizon is not always broken down into a B_{21} and a B_{22} horizon. In some areas, the B_3 horizon shows brown, yellowish brown, and other colors. A few areas have gravel and stones on the surface. The Dyke soil grades toward the Unison soil, and some areas of the latter are included with it.

This soil and other Dyke soils formed mostly from greenstone material, but there is one area in the southwestern part of the county in which greenstone material does not occur. This area has a lighter color and texture. It resembles Braddock soil in some respects but was included with this soil because of its limited acreage. Braddock soils were not mapped separately in this county. Also included are some severely eroded areas where the subsoil is exposed and areas that have cobbles on the surface.

The permeability of Dyke loam, gently sloping phase, is rapid. The content of organic matter and the natural fertility are high. Leaching takes place slowly. The capacity to absorb and retain moisture and supply it to plants is high. The soil is normally medium acid to slightly acid. It retains added plant nutrients very well. Tilth is good, but the soil is easy to work within only a narrow range of moisture content.

Use and suitability.—Approximately 70 percent of this soil is in crops, 20 percent is in pasture, and 10 percent is in forest. This is one of the best soils in the county, and all of it is suited to cultivation. It is well suited to all crops commonly grown in the county, and especially to alfalfa. (Capability unit IIe-1.)

Dyke loam, eroded sloping phase (7 to 14 percent slopes) (DyC2).—This soil has lost much of its surface layer through accelerated erosion, and the subsoil is exposed in cultivated fields. A few shallow gullies have formed on the slopes. The surface soil is 0 to 6 inches deep. In some places there are cobbles on the surface and throughout the profile. Some moderately steep areas are included with this soil.

Use and suitability.—Approximately 60 percent of this soil is in crops, 20 percent is in forest, and 20 percent is in pasture. Most of the soil is suited to crops. The moderately steep slopes and the cobbly areas are well suited to pasture. (Capability unit IIIe-1.)

Eubanks and Lloyd series

The Eubanks and the Lloyd series consist of gently sloping to moderately steep, brown, well-drained, moderately deep to deep soils of the uplands. They formed mostly in material weathered from granite and granodiorite; in some places dikes of greenstone contributed some of the parent material. The surface layer of these soils is brown to dark-brown loam, and the subsoil is red to dark-red sandy clay loam to clay. The soils are medium acid to very strongly acid. They are medium in organic-matter content and in natural fertility. Tilth is good, and the soils are easy to conserve.

The Eubanks and Lloyd soils are associated with Chester and Brandywine soils, which they resemble in mode of formation and in kind of parent material. The Eubanks and Lloyd soils differ from the Chester soils in having a redder and thicker subsoil that contains more clay. They differ from the Brandywine soils in having a well-developed profile.

The natural vegetation consists of white oak, red oak, scarlet oak, black oak, black walnut, dogwood, yellow-poplar, hickory, shortleaf pine, and scrub pine. The soils are used mostly for pasture and crops. They are very good for the crops commonly grown in the county.

Eubanks and Lloyd loams, gently sloping phases (2 to 7 percent slopes) (EuB).—The following describes a profile of Eubanks loam, gently sloping phase, in a field containing broomsedge, about 1 mile southeast of Woodville, and ½ mile east of U. S. Highway No. 522:

A_p 0 to 7 inches, brown (7.5YR 4/4), friable loam; weak, fine granular structure; gradual, smooth boundary.

A_3 7 to 10 inches, yellowish-red (5YR 4/8), friable loam; weak, coarse, subangular blocky structure; gradual, smooth boundary.

B_1 10 to 14 inches, red (2.5YR 4/6), friable clay loam; moderate, medium, subangular blocky structure; gradual, smooth boundary.

B_2 14 to 23 inches, dark-red (2.5YR 3/6), friable clay loam; moderate, medium, subangular blocky structure; thin, distinct clay films; gradual, smooth boundary.

B_3 23 to 38 inches, red (10R 4/6), friable clay loam; firm in place; weak, medium, subangular blocky structure; gradual, smooth boundary.

C 38 to 50 inches +, red, yellowish-red, and yellowish-brown, friable, loamy soil material and weathered granitic rock material.

The following describes a profile of Lloyd loam, gently sloping phase, in a field containing orchardgrass, about 1 mile east of Flint Hill, along State Highway No. 647:

A_p 0 to 5 inches, brown to dark-brown (7.5YR 4/4), very friable loam; weak, medium, granular structure; many fine roots; abrupt, smooth boundary.

B_1 5 to 9 inches, yellowish-red (5YR 4/8), friable silty clay loam; moderate, medium, subangular blocky structure; few patchy clay films; gradual, smooth boundary.

B_{21} 9 to 17 inches, dark-red (2.5YR 3/6), friable clay; moderate, medium, subangular blocky structure; common, distinct clay films; gradual, smooth boundary.

B_{22} 17 to 26 inches, dark-red (2.5YR 3/6), firm clay; strong, medium, subangular blocky to angular blocky structure; common, prominent clay films; gradual, wavy boundary.

B_3 26 to 34 inches, dark-red (2.5YR 3/6) and yellowish-red (5YR 5/8), friable clay loam; moderate, medium to fine, subangular blocky structure; few, prominent clay films; gradual, wavy boundary.

C_1 34 to 79 inches, reddish-brown and yellowish-red, very friable, weathered soil material of loam to silt loam texture; no definite structure; many fine mica flakes.

C_2 79 to 96 inches, yellowish-brown, yellow, gray, olive, and black, weathered granitic material; firm in place digs out friable; material has rock structure.

The surface soil is normally 8 to 12 inches deep. In most of the cultivated fields, it is 6 to 10 inches deep.

The color of the surface soil ranges from brown to reddish brown. The texture, although generally loam, is silt loam in some areas. Where the complex is influenced by basic dikes, the B_2 horizon in the Eubanks soil is always red, but that of the Lloyd soil is red to dark red. The thickness of the subsoil ranges from 25 to 55 inches, and the texture, from sandy clay loam to clay. The Lloyd soil has a finer textured subsoil than the Eubanks soil. It is generally clay.

The B_3 horizon is normally red, but it may be a mixture of red, yellowish red, and brown. This horizon commonly contains fine mica flakes, but where the parent material has been sheared or crushed, the flakes are more numerous. In areas where the soils of this mapping unit are associated with the gritty Brandywine loams, the surface soil has some quartz grit.

Included with the soils of this complex are some areas that have stones and gravel on the surface. A few rock outcrops are also shown on the map. These outcrops are more numerous on the Eubanks soil than on the Lloyd soil. Around the outcrops, the soil is shallower than normal and resembles Brandywine soils. Where soils of this mapping unit adjoin soils of the Chester and Culpeper series, small spots of Chester loam and possibly of Culpeper loam are included.

This complex has moderately rapid permeability. The content of organic matter and the natural fertility are medium. The capacity to absorb and retain moisture is good, as is the ability to supply moisture for plants. Plant roots and air penetrate easily. The soils are medium acid to very strongly acid, and they retain well the plant nutrients added in fertilizer. Tilth is good. The soils are easy to work within a wide range of moisture content.

Use and suitability.—Approximately 50 percent of the acreage is in crops, 40 percent is in pasture, and 10 percent is in forest. All of the acreage is suited to crops. The soils are well suited to alfalfa and other crops commonly grown in the county. (Capability unit IIe-2.)

Eubanks and Lloyd loams, eroded sloping phases (7 to 14 percent slopes) (EuC2).—This mapping unit occupies steeper slopes and is more eroded than Eubanks and Lloyd loams, gently sloping phases. The surface soil is 4 to 8 inches deep, and, in many places, the subsoil is exposed. In some areas a few stones are strewn over the surface, but they do not interfere with cultivation. Runoff is more rapid and the erosion hazard is greater than on Eubanks and Lloyd loams, gently sloping phases.

Use and suitability.—Approximately 50 percent of the acreage is in pasture, 35 percent is in crops, and 15 percent is in forest. All the acreage can be cultivated and is well suited to alfalfa and other crops commonly grown in the county. (Capability unit IIIe-2.)

Eubanks and Lloyd clay loams, severely eroded gently sloping phases (2 to 7 percent slopes) (ElB3).—This mapping unit has lost nearly all of its surface soil through erosion. It, therefore, differs from Eubanks and Lloyd loams, gently sloping phases, in texture of the surface soil, content of organic matter, workability, productivity, and use and management.

The surface layer ranges from 0 to 4 inches in thickness. The original surface soil has been mixed with the B horizon, so the present surface layer is finer textured and redder than the original. There are some active, shallow gullies, especially where the slopes break between this mapping unit and the severely eroded sloping phases of Eubanks and Lloyd clay loams. Tillage is mainly in the subsoil, and runoff is severe. In winter, frost causes heaving and crops are pushed out of the ground.

Figure 8.—**Corn on Eubanks and Lloyd clay loams, severely eroded gently sloping phases. In places where there is 4 or 5 inches of surface soil, the stand is good; but in eroded spots, not enough moisture is retained for the seeds to germinate.**

Use and suitability.—Approximately 60 percent of the acreage is used for crops, 30 percent is in pasture, and 10 percent is in forest. The soils are more difficult to cultivate than Eubanks and Lloyd loams, gently sloping phases, and are harder to conserve and to keep in good tilth. Figure 8 shows a poor stand of corn on eroded spots. Tillage is in the heavy subsoil; good seedbeds are difficult to prepare; the range of moisture content suitable for cultivation is narrow; and yields are poor. The soils of this mapping unit are best suited to permanent hay, although corn and small grains can be grown if good management is practiced. (Capability unit IIIe-4.)

Eubanks and Lloyd clay loams, severely eroded sloping phases (7 to 14 percent slopes) (ElC3).—This mapping unit is made up of soils that have lost a large part, or all, of the original surface soil through erosion. The surface soil ranges from 0 to 4 inches in thickness. Where the original surface soil has not been entirely removed, it has been mixed with the subsoil and, consequently, is heavier in texture and redder than it was.

The soils of this mapping unit contain less organic matter than Eubanks and Lloyd loams, gently sloping phases, and have poorer tilth, are subject to more runoff and erosion, and produce poorer yields. There are a few shallow gullies on these severely eroded soils.

Use and suitability.—Approximately 40 percent of the acreage is in crops, 40 percent is in pasture, and 20 percent is in forest. Pasture, small grains, and permanent hay are suitable. The soils are difficult to work and to

maintain. Their tilth is poor, and erosion is a severe hazard. They heave in winter. If they are used intensively for row crops, they will deteriorate rapidly unless good management is practiced. (Capability unit IVe-1.)

Eubanks and Lloyd clay loams, severely eroded moderately steep phases (14 to 25 percent slopes) (ElD3).—This mapping unit is shallower than Eubanks and Lloyd loams, gently sloping phases, and has little or no surface soil. The thickness of the surface soil ranges from 0 to 3 inches, and that of the subsoil, from 14 to 28 inches.

Use and suitability.—Approximately 50 percent of the acreage is in pasture, 30 percent is in crops, and 20 percent is in forest. The soils of this mapping unit are best suited to pasture and forest. Special care is needed to establish a permanent sod, but once the sod is established, it produces good pasture. (Capability unit VIe-1.)

Eubanks and Lloyd stony loams, eroded moderately steep phases (14 to 25 percent slopes) (EyD2).—This mapping unit is shallower and more stony than Eubanks and Lloyd loams, gently sloping phases. About 120 acres has slopes of 7 to 14 percent, and around 200 acres has slopes of 25 to 45 percent. The surface soil ranges from 2 to 7 inches in thickness, and the subsoil, from 8 to 24 inches. Because of erosion, the subsoil has been exposed in some areas. All areas are stony, but the size and quantity of stones vary from place to place. Rounded or spheroidal, basic rocks are scattered on the surface and throughout the soil. Some rock outcrops occur.

Use and suitability.—Approximately 25 percent of the acreage is in pasture, 10 percent is in orchards, and 65 percent is in forest. Because it is steep and stony, the mapping unit is not suited to cultivation. It is best suited to pasture but is also good for orchards. (Capability unit VIs-1.)

Eubanks-Brandywine complex, sloping phases (7 to 14 percent slopes) (EbC).—This complex consists of small areas of Eubanks loam, sloping phase, and Brandywine loam, sloping phase, so intricately associated that they cannot be separated on a map of the scale used. The well-drained Eubanks soil makes up about 70 percent of the total area of the complex, and the somewhat excessively drained Brandywine soil about 30 percent. These two soils are similar in color and in texture of the surface soil, but the surface layer of the Brandywine soil is 6 to 18 inches deep, and that of the Eubanks is 3 to 10 inches deep. The whole profile of the Eubanks soil, however, is deeper than that of the Brandywine, and it has a well-developed, red B horizon. In small areas the subsoil of the Eubanks soil is exposed.

Eubanks-Brandywine complex, sloping phases, includes about 120 acres on gentler slopes of 2 to 7 percent. It also includes areas of Lloyd soil, which are mixed with the Eubanks part of the complex. Profiles of Eubanks loam and of Lloyd loam are described under Eubanks and Lloyd loams, gently sloping phases, and a profile for Brandywine loam is described under Brandywine loam, moderately steep phase.

Use and suitability.—Approximately 50 percent of the acreage is in pasture, 30 percent is in crops, and 20 percent is in forest. Generally, Eubanks-Brandywine complex, sloping phases, is used in a long rotation consisting of corn, a small grain, and 3 years of orchardgrass pasture. A field that has been used for corn, a small grain, and mixed red clover, lespedeza, and orchardgrass is shown in figure 9. Most farmers use this complex like Eubanks and Lloyd loams, eroded sloping phases, but because of the lower moisture-supplying capacity of the Brandywine soil, yields are lower.

***Figure 9.*—Stack of baled wheat straw that was grown on Eubanks-Brandywine complex, sloping phases. Note loose straw placed on top to keep water out of bales. Apple orchards in background on Brandywine loam, moderately steep phase, and forest on steep soils on mountains.**

All of the acreage is suited to cultivation. If good management is practiced and care is taken to control erosion, soils in this complex are suited to most crops commonly grown. They are well suited to mixed hay and pasture. (Capability unit IIIe-2.)

Eubanks-Brandywine complex, eroded moderately steep phases (14 to 25 percent slopes) (EbD2).—This mapping unit has a slightly thinner profile than Eubanks-Brandywine complex, sloping phases. It is more susceptible to erosion and has, thereby, lost more of its surface soil. The surface layer of the Eubanks soil is 3 to 8 inches deep; that of the Brandywine soil is 4 to 12 inches deep. Shallow gullies occur in some areas of this complex, but in most places, permanent vegetation prevents gullying.

Use and suitability.—Approximately 60 percent of this complex is in pasture, 20 percent is in crops, and 20 percent is in forest. Mostly because of strong slopes, susceptibility to erosion, and somewhat low water-supplying capacity, this complex of soils is limited in its suitability for cultivated crops. It is best suited to permanent pasture and to orchards. (Capability unit IVe-3.)

Eubanks-Chester complex, gently sloping phases (2 to 7 percent slopes) (EcB).—This complex consists of small areas of Eubanks loam, gently sloping phase, and Chester loam, gently sloping phase, so intricately associated that they cannot be separated on a map of the scale used. The Eubanks soil makes up about 60 percent of the acreage, and the Chester soil, about 40 percent. Both of these soils are well drained and are similar in texture and color of the surface soil. The surface layer of the Eubanks soil is 6 to 12 inches deep; that of the Chester

soil is 6 to 14 inches deep. The Eubanks subsoil ranges from 36 to 55 inches in thickness, and the Chester subsoil, from 18 to 24 inches. The Eubanks part of the complex includes some Lloyd soils.

A profile of Eubanks loam is described under Eubanks and Lloyd loams, gently sloping phases, and a profile of Chester loam is described under Chester loam, gently sloping phase.

Use and suitability.—Approximately 75 percent of this complex is used for crops, 20 percent is in pasture, and 5 percent is in forest. All crops commonly grown in the county are well suited to this soil. (Capability unit IIe-2.)

Eubanks-Chester complex, sloping phases (7 to 14 percent slopes) (EcC).—This complex has a slightly thinner profile than Eubanks-Chester complex, gently sloping phases. Also it has greater runoff and has lost more of its surface layer through accelerated erosion.

Use and suitability.—Approximately 60 percent of the acreage is used for crops, 30 percent is in pasture, and 10 percent is in forest. The complex is very susceptible to accelerated erosion. If well managed, however, and if care is taken to prevent erosion, all of the acreage is suited to cultivation, especially for mixed hay and pasture. (Capability unit IIIe-2.)

Halewood series

The Halewood series consists of sloping to steep, light colored, well-drained, moderately deep soils on mountains. They formed in material weathered from granite and granodiorite. They have a dark-brown to yellowish-brown fine sandy loam surface soil and a yellowish-red to strong-brown sandy clay loam subsoil. The soils are strongly acid and are medium in organic-matter content and in natural fertility. All of them are stony, and tillage is difficult.

The Halewood soils in this county are fairly extensive in the Blue Ridge Mountains. In the western part of the county, they are associated with the Porters soils at higher elevations and with Brandywine soils at lower elevations. The Halewood soils differ from the Porters soils in having a lighter colored surface layer, a coarser surface soil, a redder subsoil, and a better developed soil profile. They differ from the Brandywine soils in texture and color and in having a well-developed profile.

The natural vegetation on the Halewood soils consists of white oak, scarlet oak, red oak, chestnut oak, black oak, poplar, chestnut sprouts, mountain-laurel, white pine, and scrub pine. Most of the soils are in forest, but some areas are used for pasture and apple orchards.

Halewood stony fine sandy loam, moderately steep phase (14 to 25 percent slopes) (HaD).—The following describes a profile in an old pasture, 1 mile southwest of the junction of State Highways 653 and 612:

A_{p1} 0 to 2 inches, dark-brown (10YR 3/3), very friable stony fine sandy loam; weak, fine, granular structure; many fine roots; few shiny grains of sand; clear, smooth boundary.

A_{p2} 2 to 6 inches, yellowish-brown (10YR 5/4), very friable fine sandy loam; weak, fine, granular structure; many fine roots; few pebbles and grains of sand; abrupt, smooth boundary.

B_1 6 to 9 inches, strong-brown (7.5YR 5/6), friable, light sandy clay loam; weak, fine, subangular blocky structure; abundant fine roots; shiny grains of sand are common; clear, smooth boundary.

B_2 9 to 24 inches, yellowish-red (5YR 5/6), friable sandy clay loam; moderate, medium, subangular blocky structure; few pebbles up to 3 inches in diameter; few fine mica flakes; few fine roots; few patchy clay films; gradual, wavy boundary.

B_3 24 to 30 inches, yellowish-red (5YR 5/8), friable, light sandy clay loam; weak, fine to medium, subangular blocky structure; contains spots of redder material inherited from the rock; gradual, smooth boundary.

C_1 30 to 64 inches, yellowish-red, light yellowish-brown, and olive, highly weathered, granitic rock material mixed with soil material; many quartz fragments up to 3 millimeters in diameter.

The surface soil ranges from 6 to 12 inches in depth and from dark grayish brown and dark brown to yellowish brown in color. In most of the wooded areas, an A_0 horizon has developed. The subsoil ranges from yellowish red to strong brown in color and from 10 to 24 inches in thickness. Its texture is mostly sandy clay loam but, in places, is clay loam. All of the soil is stony, but the size and number of stones vary. Small spots of other soils are included with Halewood stony fine sandy loam, moderately steep phase. Areas of a redder, clayey soil that resembles the Hayesville soils occur in small spots where the rock becomes more basic. The Hayesville soils were not mapped in this county. Along the western boundary of the county, small areas of Porters soils are included. Some rock outcrops occur, and the soils around these outcrops are shallower and resemble the Brandywine soils.

The permeability is moderately rapid; the content of organic matter and the natural fertility are medium; the capacity to absorb and retain moisture for plants is medium. The soil is mostly strongly acid. Tillage is difficult; if it were not for the stones the soil would be easy to work within a rather wide range of moisture content.

Use and suitability.—Approximately 85 percent of this soil is in forest, 10 percent is in pasture, and 5 percent is in orchards. This soil is best suited to apple orchards, forest, and native pasture. Stoniness and steepness of slope make the soil unsuited to cultivation and to the use of heavy farm machinery. (Capability unit VIs-1.)

Halewood stony fine sandy loam, sloping phase (7 to 14 percent slopes) (HaC).—This soil is smoother and less eroded than Halewood stony fine sandy loam, moderately steep phase. The thickness of the surface soil ranges from 8 to 12 inches, and that of the subsoil, from 18 to 24 inches. All of this soil is stony, but the size and number of stones vary. There are more red spots than in the moderately steep phase of Halewood stony fine sandy loam, and some areas are gently sloping.

Use and suitability.—Approximately 80 percent of this soil is in forest, 10 percent is in pasture, and 10 percent is in orchards. Its best use is for apple orchards. Stoniness restricts use for cultivated crops. (Capability unit IVs-1.)

Halewood stony fine sandy loam, steep phase (25+ percent slopes) (HaE).—This soil has a slightly thinner profile than Halewood stony fine sandy loam, moderately steep phase. The surface soil ranges from 6 to 8 inches in thickness, and the subsoil, from 10 to 20 inches. An A_0 horizon has developed in the forested area. More soil creep has occurred on this steep soil than on the moderately steep phase of Halewood stony fine sandy loam, and its subsoil is not so strongly developed.

Use and suitability.—Approximately 95 percent of this soil is in forest, and 5 percent is in pasture. It is best suited to forest because steep slopes and stones limit use of farm machinery. (Capability unit VIIs-1.)

Hazel series

The Hazel series consists of sloping to steep, brown, excessively drained, shallow soils of the uplands. They formed in material weathered from phyllite and from a mixture of sandstone and granitic rock. These soils have a dark-brown loam surface layer and little or no subsoil development. They are strongly acid. Their organic-matter content and natural fertility are fairly low. Tilth is good except on steep slopes where stoniness makes tilth poor. The soils are easy to conserve.

The Hazel soils are inextensive and occur mostly in the eastern part of the county. They are associated with the Culpeper, Albemarle, and Louisburg soils. They differ from the Louisburg soils in having a browner surface layer and in being more fertile. They differ from the Culpeper and Albemarle soils in having little or no subsoil development.

The natural vegetation on the Hazel soils consists of white oak, black oak, red oak, chestnut oak, mountain-laurel, dogwood, chestnut sprouts, and some scrub pine. The soils are used mostly for pasture and trees. They are poor for cultivated crops.

Hazel loam, moderately steep phase (14 to 25 percent slopes) (HeD).—The following describes a profile in a pasture containing bluegrass and broomsedge, located 3 miles southeast of Scrabble at the end of State Highway No. 650:

- A_1 0 to 2 inches, dark-brown (10YR 3/3), very friable loam; weak, fine, granular structure; many fine roots; abrupt, smooth boundry.
- A_2 2 to 7 inches, brown (10YR 4/3), very friable loam to fine sandy loam; weak, fine, granular structure; many fine roots; many sandstone pebbles up to 2 inches in diameter; gradual, smooth boundary.
- C_1 7 to 46 inches, yellowish-brown (10YR 5/4), very friable fine sandy loam from highly weathered sandstone material; many sandstone pebbles up to 2 inches in diameter; structureless.
- C_2 46 to 58 inches, brown, firm rock material; many mica flakes; material retains structure of the original rock but is soft enough to be dug with hand tools.

Because of differences in the parent material, the texture of the surface soil ranges from silt loam to very fine sandy loam. The surface soil is normally 8 to 14 inches deep. However, in areas where erosion has been active, a few gullies have formed and the surface soil is only 2 to 8 inches deep. The color of the surface soil ranges from brown or dark brown to dark grayish brown. In most of the wooded areas, an A_0 horizon occurs. Although in most places no subsoil has developed, this soil has some reddish spots, usually 4 to 8 inches thick, where the texture is a clay loam. Depending upon the source of parent material, these red spots resemble the Culpeper soils. Other inclusions are small areas of Brandywine and Louisburg soils. In some areas loose fragments of quartz and slate are strewn on the surface. Rock outcrops are indicated on the map by symbols.

Hazel loam, moderately steep phase, is rapidly permeable. It is low in content of organic matter and in natural fertility. Leaching is somewhat rapid. The capacity to absorb and retain moisture for plants is low. This soil is normally strongly acid and has a moderately low ability to retain fertility gained by applying lime and plant nutrients. Tilth is good, and the soil is easy to work within a wide range of moisture content.

Use and suitability.—Approximately 50 percent of this soil is in woods, 45 percent is in pasture, and 5 percent is in crops. The soil is best suited to trees. It is generally well suited to pasture, but, in summer, lack of moisture lowers yields. (Capability unit VIe-2.)

Hazel loam, sloping phase (7 to 14 percent slopes) (HeC).—This soil has smoother slopes and a slightly deeper profile than Hazel loam, moderately steep phase. The surface soil is 10 to 14 inches thick and has more red spots than that of the moderately steep phase. The subsoil is more developed; it ranges up to 8 inches in thickness but is absent in some places. Where it is present, the subsoil is reddish-brown to red clay loam that normally has a high content of mica.

Use and suitability.—Approximately 50 percent of this soil is used for pasture, 20 percent is used for crops, and 30 percent is used for forest. This soil is best suited to pasture and forest. Shallowness and droughtiness limit use for crops because yields are poor in dry seasons. (Capability unit IVe-2.)

Hazel loam, steep phase (25+ percent slopes) (HeE).—Normally this soil is shallower to bedrock and has more rock outcrops than Hazel loam, moderately steep phase.

Use and suitability.—Approximately 90 percent of this soil is in forest, and 10 percent is in pasture. Forest is its best use. This soil is fair for pasture but is not so well suited as Hazel loam, moderately steep phase, because it is more droughty and, where cleared, is more eroded. (Capability unit VIIe-1.)

Hazel stony loam, moderately steep phase (14 to 25 percent slopes) (HsD).—Stones are strewn over the surface of this soil and throughout the profile. The stones prohibit use of farm machinery other than very light implements or hand tools. They are about a foot in diameter, are 2½ to 5 feet apart, and cover about 3 to 15 percent of the surface.

Use and suitability.—Approximately 95 percent of this soil is in forest, and 5 percent is in pasture. The soil is best suited to forest, but pasture of poor quality grows in places. (Capability unit VIs-2.)

Hazel stony loam, steep phase (25+ percent slopes) (HsE).—This soil is steeper and more shallow to bedrock than Hazel stony loam, moderately steep phase. It is more eroded and droughty and has greater runoff of surface water. All of this soil is now in forest and is best for that use. It is too steep, stony, and droughty for cultivation. (Capability unit VIIs-2.)

Hiwassee series

The Hiwassee series consists of gently sloping to sloping, dark-colored, well-drained, deep, old alluvial soils. They formed in old alluvial materials that washed from the Piedmont Plateau and the Blue Ridge Mountains. These materials were deposited when the streams flowed at a higher level. The soils have a dark-brown to dark reddish-brown surface soil and a dark-red subsoil. They are medium acid to strongly acid. Their content of organic matter and their natural fertility are high. Where they are not eroded, the soils have good tilth and are easy to conserve.

The Hiwassee soils are extensive on the benches of terraces along the Hazel River and the Hughes River. Associated with them are Wickham and Altavista soils, which they resemble in mode of formation and in kind of parent material. The Hiwassee soils differ from the Wickham soils in having a dark-red, thicker subsoil that contains more clay.

The natural vegetation consists of black oak, red oak, scarlet oak, white oak, black walnut, black locust, yellow-poplar, dogwood, hickory, and some shortleaf pine. Most of the acreage has been cleared and is used for crops. The soils are very good for all crops commonly grown in the county.

Hiwassee loam, gently sloping phase (2 to 7 percent slopes) (HwB).—The following describes a profile in a pasture containing bluegrass, ⅓ mile east of State Highway No. 231, near Rivercombs corner:

- A_p 0 to 5 inches, dark-brown (7.5YR 3/2), very friable loam; weak, fine, granular structure; few well-rounded pebbles; many fine roots; abrupt, smooth boundary.
- A_3 5 to 8 inches, dark reddish-brown (5YR 3/4), very friable loam; weak, medium, granular structure; many fine roots; clear, smooth boundary.
- B_{21} 8 to 15 inches, dark-red (2.5YR 3/6), friable clay; weak, fine to medium, subangular blocky structure; few fine roots; few patchy clay films; slightly sticky when wet; gradual, wavy boundary.
- B_{22} 15 to 67 inches, dark-red (10R 3/6), firm clay; strong, medium to fine, subangular blocky structure; slightly sticky and slightly plastic when wet; common prominent clay films; gradual, wavy boundary.
- B_3 67 to 114 inches, red (10R 4/6), firm clay; moderate, fine to medium, subangular blocky structure; common fine mica flakes; few weathered rock fragments; common prominent clay films; clear, smooth boundary.
- D 114 to 132 inches, highly weathered, micaceous, granitic rock material; firm in place.

The surface soil is 6 to 14 inches deep. It ranges from loam to silt loam in texture and from dark brown to dark reddish brown in color. The subsoil ranges from 30 to 100 inches in thickness and is mostly dark red in color. The texture of the subsoil is clay, which is slightly sticky and plastic when wet. In some areas there is a layer of gravel beneath the B horizon. Included with Hiwassee loam, gently sloping phase, are areas that have many rounded, quartz pebbles and cobblestones on the surface; these areas are indicated on the map by rock outcrop symbols. Several areas in nearly level places on ridgetops are also included with this soil.

This soil is rapidly permeable. It is high in content of organic matter and in natural fertility. Leaching occurs slowly. The capacity to absorb and retain moisture for plants is high. The soil is normally medium acid to very strongly acid and is high in its ability to retain fertility gained by applying lime and plant nutrients. Tilth is fairly good, but the soil has a narrow range of moisture content within which it can be cultivated.

Use and suitability.—Approximately 90 percent of this soil is used for crops and pasture, and 10 percent is in forest. All of the acreage is suited to crops. This soil, one of the best in the county, is well suited to alfalfa and all other crops commonly grown. It is the best soil in the county for peach orchards. (Capability unit IIe-1.)

Hiwassee loam, sloping phase (7 to 14 percent slopes) (HwC).—Compared with Hiwassee loam, gently sloping phase, this soil has its B horizon shallower to bedrock or to the old surface soil buried under the alluvial deposits. More eroded spots occur, and more gravel and cobbles are on the surface and in the underlying soil material than in Hiwassee loam, gently sloping phase.

Use and suitability.—Approximately 50 percent of this soil is in pasture, 35 percent is in crops, and 15 percent is in forest. All of this soil is well suited to crops; it needs careful management, however, to control erosion and runoff. It is well suited to alfalfa and peaches. (Capability unit IIIe-1.)

Hiwassee clay loam, severely eroded gently sloping phase (2 to 7 percent slopes) (HtB3).—Nearly all of the original surface layer of this soil has been removed through erosion. All of the original surface soil has been removed in some places, but in others it is up to 4 inches thick. Where original surface soil remains, it has been mixed with the subsoil and, consequently, is finer textured and more red than it once was. Some active, shallow gullies occur, especially where this soil breaks to Hiwassee loam, sloping phase. Tillage of this severely eroded soil is mainly in the subsoil, which heaves in winter.

Use and suitability.—Approximately 50 percent of this soil is used for crops, 45 percent is in pasture, and 5 percent is in forest. Because it is so eroded, this soil is more difficult to cultivate, to conserve, and to keep in good tilth than Hiwassee loam, gently sloping phase. Crop yields are smaller because tillage is in the heavy subsoil, and because of erosion, tilth is poor. Good seedbeds are difficult to prepare; stands of many crops are poor. This soil is best suited to hay, but if it is well managed, corn and small grains can be grown. This soil has a narrow range of moisture content within which it can be cultivated. (Capability unit IIIe-4.)

Hiwassee clay loam, severely eroded sloping phase (7 to 14 percent slopes) (HtC3).—This soil has lost most, or all, of its original surface soil through erosion. The original surface soil is absent in some places and up to 4 inches in thickness in others. Where remnants of the original surface soil remain, they have been mixed with the B horizon and are, therefore, finer textured and more red than they once were. Less organic matter is in this soil than in Hiwassee loam, gently sloping phase, and yields are low. Tilth is poor, and runoff and erosion are greater than on the gently sloping phase. Included with this eroded soil are small, gullied spots and areas that are on moderately steep slopes.

Use and suitability.—Approximately 50 percent of this soil is in pasture, 40 percent is in crops, and 10 percent is in forest. It is best suited to pasture, small grains, and permanent hay. Workability of the soil is poor, and it is difficult to maintain good tilth. The soil heaves in winter, and erosion is severe. If the soil is used intensively for row crops, it deteriorates rapidly. It is suited to crops only if good management is practiced. (Capability unit IVe-1.)

Louisburg series

The Louisburg series consists of sloping to steep, light-colored, excessively drained, shallow soils of the uplands. They formed in material weathered from arkosic sandstone, quartzite, and phyllite. These soils have a grayish-brown sandy loam surface layer and little or no subsoil

development. They are very strongly acid to extremely acid. Their organic-matter content and natural fertility are very low. Tilth is good except on steep slopes where stoniness makes tilth poor. The soils are easy to conserve.

The Louisburg soils are extensive in the eastern part of the county between Scrabble and Viewtown. Associated with them are the Culpeper and Albemarle soils, which they resemble in mode of formation and in kind of parent material. The Louisburg soils differ from the Culpeper soils in having less development and horizonation throughout.

The natural vegetation consists of white oak, red oak, black oak, scarlet oak, chestnut oak, mountain-laurel, shortleaf pine, and scrub pine. Most of the acreage is in forest. Some areas are used for pasture and crops, but they are poorly suited to such use.

Louisburg sandy loam, moderately steep phase (14 to 25 percent slopes) (LoD).—The following describes a profile under a hardwood forest, ¼ mile north of Scrabble, along a fire trail:

- A_0 0 to 1 inch, dark-gray (10YR 4/1), decayed leaf material; abrupt, smooth boundary.
- A_1 0 to 10 inches, yellowish-brown (10YR 5/4), very friable sandy loam; weak, fine, granular structure; few quartz pebbles and grains of sand; few fine mica flakes; gradual, smooth boundary.
- A_3 10 to 15 inches, yellowish-brown (10YR 5/4), very friable loam; fine, medium, granular structure; few mica flakes; many quartz pebbles and grains of sand; gradual, smooth boundary.
- C_1 15 to 24 inches, highly weathered sandstone; variously colored with brown, yellow, and white; many mica flakes; firm in place, friable when dug; material has structure of rock.

The surface soil is 6 to 16 inches deep. In texture it ranges from fine sandy loam to coarse sandy loam, and in color, from dark gray, grayish brown, and brownish yellow to brown. The depth to fairly hard rock varies from about 6 inches to as much as 40 inches. There is little or no subsoil development. In places where a subsoil occurs, it is 2 to 6 inches thick. Louisburg sandy loam, moderately steep phase, includes small areas that have loose stones on the surface and rock outcrops embedded in the soil. These outcrops are indicated on the map by symbols. Small areas of Albemarle soils are also included.

This soil is very rapidly permeable, and is very strongly acid to extremely acid. It is very low in organic matter and in natural fertility. The soil leaches rapidly because the internal drainage is excessive. The water-holding capacity is low. This soil has good tilth and can be worked within a wide range of moisture content. Conservability is fair to poor.

Use and suitability.—Approximately 75 percent of this soil is in forest, 20 percent is in pasture, and 5 percent is in crops. The soil is best suited to forest. It is not suited to crops. Yields are low, and it is difficult to build up and maintain the soil. If good management is practiced, this soil is fairly well suited to pasture. (Capability unit VIe-2.)

Louisburg sandy loam, sloping phase (2 to 14 percent slopes (LoC).—Although some areas contain shallow gullies, this soil has good tilth and is easy to conserve. It includes all the gently sloping areas of Louisburg sandy loam because they are too small to map separately. A greater proportion of Albemarle soils is included with this soil than with Louisburg sandy loam, moderately steep phase.

Figure 10.—Shortleaf pine, 20 years old, on Louisburg soils, steep phases.

Use and suitability.—Approximately 70 percent of this soil is in forest, 15 percent is in pasture, and 15 percent is in crops. It is best suited to pasture and forest. It is not suited to cultivated crops (Capability unit IVe-2.)

Louisburg soils, steep phases (25+ percent slopes) (LsE).—These soils differ from Louisburg sandy loam, moderately steep phase, in occupying steeper slopes, in having stones strewn over the surface, and in having a slightly thinner solum. Small areas of acidic, stony land and areas containing rock outcrops are mapped with this soil. Nearly all of the acreage is in forest and is best for that use. A stand of shortleaf pine is shown in figure 10. (Capability unit VIIs-2.)

Louisburg stony sandy loam, sloping phase (7 to 14 percent slopes) (LyC).—This soil differs from Louisburg sandy loam, moderately steep phase, in occupying smoother slopes and in having more stones strewn over the surface and throughout the profile. Rock outcrops are common. Loose stones on the surface, about 2½ to 5 feet apart, cover about 3 to 15 percent of the surface. Most of them could be picked up. The stones prohibit use of farm machinery other than very light implements or hand tools.

Use and suitability.—Approximately 60 percent of this soil is in forest, 10 percent is in crops, and 30 percent is in pasture. This soil is best suited to forest; it is not suited to cultivation. Stoniness, shallowness, and droughtiness make it difficult to maintain good pasture. (Capability unit IVs-2.)

Louisburg stony sandy loam, moderately steep phase (14 to 25 percent slopes) (LyD).—Stones are strewn over the surface and throughout the profile of this soil in numbers that prohibit use of any except light farm machinery and hand tools. The stones, 2½ to 5 feet apart, cover about 3 to 15 percent of the surface.

Use and suitability.—Approximately 75 percent of this soil is in forest, 23 percent is in pasture, and 2 percent is in crops. This soil is not suitable for cultivation; it is best suited to forest. (Capability unit VIs-2.)

Made land

Made land (Mc).—This mapping unit consists mostly of areas that have been built up artificially. It is used for building sites, playgrounds, picnic areas, and park-

ing lots. Made land is not suited to cultivation and has no agricultural value. Only a few areas were mapped. (Capability unit VIIIs-1.)

Meadowville series

The Meadowville series consists of gently sloping, brown, moderately well drained to well drained, deep soils. They formed in recent colluvium that washed from soils of the uplands on the Piedmont Plateau. The soils have a dark-brown to reddish-brown surface soil and a yellowish-brown to red subsoil. They are medium acid. Their organic-matter content and natural fertility are high. Tilth is good, and the soils are easy to conserve.

The Meadowville soils are extensive throughout the Piedmont area of the county. They are at the base of slopes, in depressions, and along small drainageways. Associated with them are Eubanks, Chester, Brandywine, Culpeper, and Belvoir soils. The Meadowville soils differ from those soils in being more recently developed and in not having so distinct profile layers as the upland soils.

The natural vegetation consists of white oak, red oak, black oak, scarlet oak, black walnut, yellow-poplar, and shortleaf pine. The acreage is used mostly for pasture and crops. It is good for most of the crops grown in the county.

Meadowville loam (2 to 7 percent slopes) (Me).—The following describes a profile in a hayfield containing orchardgrass, ¾ mile southeast of Rediviva, just off U. S. Highway No. 522:

- A_p 0 to 11 inches, brown to dark-brown (10YR 4/3), very friable loam; weak, fine, granular structure; many fine roots; clear, smooth boundary.
- A_3 11 to 21 inches, dark-brown (7.5YR 3/2), friable, heavy loam; few, faint mottles of strong brown (7.5YR 5/6); moderate, medium, granular structure; few fine roots; clear, smooth boundary.
- B_2 21 to 28 inches, brown to dark-brown (7.5YR 4/4), friable silty clay loam; weak, fine to medium, subangular blocky structure; few patchy clay films; clear smooth boundary.
- B_3 28 to 36 inches, light yellowish-brown (10YR 6/4), friable sandy clay loam; few, fine mottles of yellowish brown (10YR 5/6); moderate, medium to fine, subangular blocky structure; few patchy clay films; clear, smooth boundary.
- C_1 36 to 41 inches, coarse sandy loam soil material; numerous fine and medium pebbles.

This soil is up to 10 feet deep, but its average depth is 4 feet. The surface soil ranges from 10 to 24 inches in depth and from loam to silt loam in texture. In places where this soil is near sandstone, it is a fine sandy loam. The surface layer is commonly brown, but when this soil occurs with red soils, that layer is brownish red to red. The subsoil is brown, yellowish brown, reddish brown, or red and has a sandy clay loam to silty clay loam texture. In places, especially at the heads of draws, very little subsoil has formed and the soil resembles soils on the bottom lands. In most areas, however, the soil has distinct profile development and, below 20 inches, changes in color and in texture. Included with this soil is a small acreage of Starr silt loam, which was not mapped separately in this county. It has a dark-brown to reddish-brown surface soil and a reddish-brown to red subsoil. Small, somewhat poorly drained to poorly drained areas of Worsham soil are also mapped with Meadowville loam. These areas are shown on the map by wet-spot symbols. Some nearly level and sloping areas are also included.

This soil has moderate permeability. It is medium acid to slightly acid and is high in content of organic matter and in natural fertility. The water-holding capacity is high. Seepage water from the slopes keeps the soil fairly moist even when the surrounding soils are dry. Workability is good, and the soil is easy to conserve. Most crops grown in the county are well suited to this soil.

Use and suitability.—Approximately 50 percent of this soil is in pasture, 35 percent is in crops, and 15 percent is in forest. The soil is best suited to corn, hay crops, and pasture. All of the acreage can be cropped, but in some areas drainage is necessary. The soil is not well suited to alfalfa or small grains. Alfalfa grows well for 2 or 3 years and then gradually dies. This soil is very good for home gardens. (Capability unit IIw-1.)

Myersville series

The Myersville series consists of sloping to moderately steep, brown, well-drained, moderately deep soils of the Blue Ridge Mountains. They formed in material weathered from greenstone. These soils have a dark-brown to dark reddish-brown silt loam surface layer and a reddish-brown to dark-red silty clay loam to clay subsoil. They are medium acid to very strongly acid and are high in content of organic matter and in fertility. All of these soils are stony, and tillage is difficult.

The Myersville soils are extensive in the northwestern part of the county in the Blue Ridge Mountains. Associated with them are Porters soils, from which they differ in color, texture, content of clay, and parent material.

The natural vegetation on the Myersville soils consists of redbud, black locust, black birch, dogwood, yellow-poplar, white oak, scarlet oak, red oak, black oak, and hickory. Although most of the soils are in forest in the Shenandoah National Park, some areas are used for apple orchards.

Myersville stony silt loam, sloping high phase (7 to 14 percent slopes) (MyC).—The following describes a profile under young hardwood forest, 1¼ miles north of Compton Gap, along a fire trail:

- A_p 0 to 5 inches, dark reddish-brown (5YR 3/4), very friable stony silt loam; weak, fine, granular structure; many fine roots; few stones; abrupt, smooth boundary.
- B_1 5 to 11 inches, reddish-brown (5YR 4/4), friable, light sandy clay loam; weak, fine, subangular blocky structure; few stones; few fine roots; abrupt, smooth boundary.
- B_2 11 to 26 inches, reddish-brown (5YR 4/4), friable silty clay loam; weak, medium, subangular blocky structure; many stones; few patchy clay films; gradual, smooth boundary.
- C_1 26 to 46 inches, highly weathered greenstone mixed with some soil material.

The surface soil ranges from 4 to 9 inches in thickness and from dark brown to dark reddish brown in color. All of this soil is stony, but the size and number of stones vary. The cleared areas are less stony than the wooded areas, but most of these cleared areas are in the Shenandoah National Park and are reverting to forest.

The subsoil is 12 to 24 inches deep. The B_2 horizon ranges from reddish brown to dark red and from silty clay loam to clay. Nearly all of this soil has rock outcrops and loose stones on the surface. Around these rock outcrops, the soil is shallower than normal.

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The permeability of this soil is moderate. The content of organic matter and the natural fertility are fairly high, and the soil retains well the fertility gained by applying lime and plant nutrients. Leaching occurs slowly. The soil is high in its capacity to absorb and retain moisture for plants. It is medium acid to very strongly acid. Because of stoniness, the soil is difficult to cultivate.

Use and suitability. Approximately 80 percent of this soil is in forest, and 20 percent is in pasture and apple orchards. This soil is best suited to forest and apple orchards. It is good for bluegrass pasture if light machinery or hand tools are used. Stoniness limits its use for cultivated crops. (Capability unit IVs-1.)

Myersville stony silt loam, moderately steep high phase (14 to 25 percent slopes) (MyD).—This soil has a slightly thinner surface soil and subsoil than Myersville stony silt loam, sloping high phase. Some of the surface soil has been lost through accelerated erosion. The thickness of the subsoil ranges from 8 to 14 inches, and there are not so many red areas in this soil as in the sloping high phase. All of the soil is stony, but the size and number of stones vary. All steep areas of Myersville stony silt loam are included in this mapping unit.

Use and suitability.—Approximately 85 percent of this soil is in forest, 10 percent is in pasture, and 5 percent is in orchards. None of this soil is suited to cultivation. It is best suited to forest and apple orchards, but, if well managed, it is good for pasture. (Capability unit VIs-1.)

Porters series

The Porters series consists of gently sloping to steep, dark, well-drained, moderately deep soils on the mountains. Formed in material weathered from granodiorite, these soils have a very dark brown surface layer and a strong-brown sandy clay loam subsoil. The soils are strongly acid. All of them are stony and have poor tilth, but they are easy to conserve.

The Porters soils are extensive throughout the Blue Ridge Mountains in this county. Associated with them are Halewood and Ramsey soils. The Porters soils have a darker surface layer and a less well developed subsoil than the Halewood soils. They are also more friable and are at higher elevations. They are better developed than the Ramsey soils and have different parent material.

The natural vegetation on the Porters soils consists of red oak, scarlet oak, chestnut oak, white oak, pitch pine, Table-Mountain pine, white pine, mountain-laurel, and hemlock. Most of the Porters soils in this county are in the Shenandoah National Park and are forested; they could be suitable for orchards.

Porters stony loam, moderately steep phase (14 to 25 percent slopes) (PoD).—The following describes a profile under hardwood forest, in the Blue Ridge Mountains near Compton Gap:

- A_0 0 to 2 inches, black (10YR 2/1), partly decomposed organic matter; abrupt, smooth boundary.
- A_1 0 to 2 inches, very dark brown (10YR 2/2), very friable stony loam; weak, fine, granular structure; abundant fine roots; abundant stones; many fragments of gravel-size rock; abrupt, smooth boundary.
- A_2 2 to 9 inches, brown to dark-brown (10YR 4/3), very friable loam; weak, fine, granular structure; plentiful fine roots; many stones and fragments of gravel-size rock; clear, smooth boundary.
- B_2 9 to 21 inches, strong-brown (7.5YR 5/6) sandy clay loam; weak, fine to medium, subangular blocky structure; many fine roots; many stones and fragments of gravel-size rock; clear, wavy boundary.
- C_1 21 to 42 inches, friable, partially weathered granodiorite mixed with sandy clay loam soil material; few roots; about 60 percent of the horizon is unweathered granodiorite stone fragments, ½ to 12 inches in diameter.

None of this soil has been farmed since 1935, and most of the cleared land is now reverting to forest. In many of the old orchards, the surface soil is lighter in color and an A_0 horizon is beginning to form again. The surface soil is 8 to 18 inches deep and ranges from very dark brown to black. The subsoil ranges from 0 to 18 inches in thickness, and, in color, from strong brown to yellowish brown. In areas where no subsoil has developed, the soil is 18 inches deep over hard rock. These areas are normally black and have a high content of organic matter. In some places, a 3- to 6-inch B_3 horizon has developed. This layer is yellowish brown and contains many rock fragments.

All of the soil is stony, but the size and number of stones vary. Rock outcrops are common, and the soil around them is shallower and contains more sand than normal. Included with Porters stony loam, moderately steep phase, are areas of sandy loam near rocks that are more acidic than normal. Small areas of Halewood soils are also included.

This soil has moderately rapid permeability. The content of organic matter is high to very high, and the natural fertility is medium. The ability to retain fertility gained by applying lime and plant nutrients is medium. The capacity to absorb and retain moisture for plants is medium. The soil is normally strongly acid. All of it is stony and, consequently, has poor tilth. If it were free of stones, the soil would be easy to work within a wide range of moisture content. It is easy to conserve this soil.

Use and suitability.—Approximately 95 percent of this soil is in forest, and 5 percent is in pasture. Because of stoniness and steepness of slope, this soil is not suited to cultivation. Where the stones are not too numerous to interfere with mowing, pasture grows well. The soil is best suited to forest and apple orchards. (Capability unit VIs-1.)

Porters stony loam, gently sloping phase (2 to 7 percent slopes) (PoB).—This soil is on long, narrow ridgetops in the Blue Ridge Mountains. It has a thicker profile and smoother slopes than Porters stony loam, moderately steep phase. All of it has been cropped; the organic matter has been destroyed, and the soil is lighter in color than it was originally. The subsoil is more developed than that of the moderately steep phase and is normally deeper, or 18 to 26 inches in thickness. Most of the stones have been removed from the surface, but they occur throughout the profile.

Use and suitability.—All of this soil is in forest; it is best suited to forest, pasture, or orchards. Stoniness greatly limits use for cultivated crops. The soil is excellent for gardens, but much hand labor is necessary to prepare it for such use. (Capability unit IVs-1.)

Porters stony loam, sloping phase (7 to 14 percent slopes) (PoC).—This soil has smoother slopes and a thicker profile than Porters stony loam, moderately steep phase.

At one time many orchards grew on this soil; today, most of the acreage is in the Shenandoah National Park and is reverting to forest. The subsoil ranges from 10 to 20 inches in thickness. The degree of development varies but is mostly weak. All of this soil is stony and contains rock outcrops.

Use and suitability.—All of this soil is in forest; it is best suited to forest, pasture, and orchards. Stoniness limits use for cultivation. (Capability unit IVs-1.)

Porters stony loam, steep phase (25 to 45 percent slopes) (PoE).—This soil is steeper and more susceptible to erosion than Porters stony loam, moderately steep phase. Rock outcrops are more numerous, and more stones are on the surface. This soil is not suited to cultivation. (Capability unit VIIs-1.)

Ramsey series

The Ramsey series consists of steep, light-colored, excessively drained, shallow soils on the mountains. They formed in material weathered from sandstone and quartzite. Their surface layer is mostly a pale-brown fine sandy loam, and little or no subsoil has developed. These soils are strongly acid. Their organic-matter content is medium, and their fertility is low. Tilth is poor, and the soils are difficult to conserve.

The Ramsey soils are inextensive in this county and are only in the Blue Ridge Mountains between Pass Mountain and Jeremys Run Overlook. They are associated with the rocky Porters soils, from which they differ in having no subsoil development. They are finer textured and more shallow to bedrock than the Porters soils.

The natural vegetation on the Ramsey soils consists of red oak, chestnut oak, scarlet oak, pitch pine, Table-Mountain pine, and mountain-laurel. Most of the acreage is in forest; it is poor for crops.

Ramsey stony fine sandy loam, steep phase (14 to 45 percent slopes) (RaE).—The following describes a profile of this soil under hardwood forest in the Blue Ridge Mountains, 5 miles north of Panorama along the Skyline Drive:

- A_1 0 to 1 inch, very dark gray (10YR 3/1), very friable stony fine sandy loam; weak, very fine, granular structure; many fine roots; many stones and rock fragments; abrupt, smooth boundary.
- A_2 1 to 8 inches, pale-brown (10YR 6/3), very friable fine sandy loam; very weak, fine, granular structure; numerous fragments of gravel-size rock; few stones; gradual, smooth boundary.
- C 8 inches +, shattered and partially weathered sandstone rock material.

The surface soil ranges from 2 to 12 inches in thickness, and from loam to fine sandy loam in texture. In places where an A_0 horizon has developed, the A horizon below it is darker in color than it is ordinarily. This soil has developed no B horizon. All of the acreage is stony, but the size and number of stones vary. Most of the stones are sandstone, but some are quartzite and red shale. Because they were too small to map separately, areas of sloping and moderately steep Ramsey soils were included with this steep soil.

This soil has very rapid permeability. The content of organic matter is medium to high; the natural fertility is low. The fertility gained by applying lime and plant nutrients is difficult to retain. The capacity to absorb and retain moisture for plants is low. Normally, the soil is strongly acid. Tilth is poor, but the soil is fairly easy to conserve. All of the acreage is in forest. It is not suited to cultivation and should remain in forest. (Capability unit VIIs-2.)

Riverwash

Riverwash (0 to 2 percent slopes) (Rd).—This land type consists mainly of alluvial sand, gravel, and cobblestones that have been recently deposited along some of the large streams in the county. In some places, Riverwash consists mostly of rocky and gravelly bars; in other places, it is a stratum of brown and white, very loose, coarse sand overlying gravel and cobblestones. In still other areas, sand and gravel are left after a flood. This land type is closely associated with the Congaree and Buncombe soils.

Riverwash has very rapid permeability. The content of organic matter and the natural fertility are very low, and the fertility gained by applying lime and plant nutrients is very poorly retained. The capacity to absorb and retain moisture for plants is very low. This land type is strongly acid. Tilth is very poor.

Use and suitability.—Almost all of this land type is idle. The loose, open texture of Riverwash and the risk of floods make its suitability for use very narrow. It has little or no agricultural value as it is not suited to crops, pasture, or forest. (Capability unit VIIIs-1.)

Roanoke series

The Roanoke series consists of nearly level, gray, poorly drained, moderately deep soils of the terraces. They formed in material washed from the soils of the Piedmont Plateau and the adjacent mountains. These soils have a gray, mottled silt loam surface layer and a prominently mottled, gray and yellow clay subsoil. Tilth is poor, but the soils are easy to conserve.

The Roanoke soils are associated with the Wickham, Altavista, and Augusta soils, which they resemble in mode of formation and in kind of parent material. The Roanoke soils differ from the associated soils in occupying the lowest elevation and in being poorly drained. They also have more clay in the subsoil and are more plastic than the associated soils.

The natural vegetation of the Roanoke soils consists of sycamore, willow, scarlet oak, swamp oak, white oak, red maple, American elm, and river birch. The Roanoke soils are used mostly for pasture, hay, small grains, and corn, but they are poor for crops commonly grown in the county.

Roanoke silt loam (0 to 2 percent slopes) (Re).—The following describes a profile in an old pasture containing wild grasses, 700 yards north of the junction of State Highways 618 and 231, along Highway 231:

- A_p 0 to 10 inches, dark-gray (5Y 4/1), very friable silt loam, with mottles of grayish brown (2.5Y 5/2); moderate, fine to medium, granular structure; many fine roots; few black concretions; abrupt, smooth boundary.
- B_1 10 to 13 inches, light olive-gray (5Y 6/2), friable, light sandy clay loam; common, distinct mottles of yellowish brown (10YR 5/6) and light gray (5Y 7/1); moderate, medium, subangular blocky structure; many black concretions; slightly sticky when wet; gradual, wavy boundary.
- B_{21g} 13 to 18 inches, light olive-gray (5Y 6/2), firm clay loam; common, distinct mottles of yellowish brown (10YR

5/6); coarse, angular blocky structure; plastic and sticky when wet, hard when dry; few patchy clay films; gradual, wavy boundary.

B_{22g} 18 to 30 inches, gray (N 5/0), plastic clay; common, distinct mottles of pale olive (5Y 6/3) and yellowish brown (10YR 5/6); coarse, angular blocky and thick, platy structure; common prominent clay films; very plastic and sticky when wet, very hard when dry; gradual, wavy boundary.

C_1 30 to 36 inches +, light olive-brown (2.5Y 5/6) sandy clay loam soil material between cobbles and gravel; mottles of pale olive (5Y 6/3).

The surface soil ranges from 8 to 14 inches in thickness and, in color, from light gray and mottled yellowish brown to mottled dark gray. The mottles are faint to distinct. Most of this soil has been bedded, which makes the A horizon vary in thickness and color. The color of the subsoil varies from highly mottled, gray and light olive gray to olive gray with shades of yellow and brown. The texture and consistence of the subsoil range from friable sandy clay loam to plastic clay. The depth to parent material is variable but is generally more than 30 inches. Some areas have a layer of gravel and cobbles at a depth of about 30 inches. The water table rises in this soil very quickly. Included with Roanoke silt loam are small areas of Worsham and Augusta soils and areas which have a fine sandy loam or loam surface soil.

The permeability of Roanoke silt loam is very slow. The content of organic matter and the natural fertility are moderately low to low. The soil is normally strongly acid throughout. Surface runoff is very slow, and water tends to pond; internal drainage is very slow. The water table is high. Tilth is poor, but the soil is easy to conserve.

Use and suitability.—Approximately 40 percent of this soil is in crops, 40 percent is in pasture, and 20 percent is in forest. This soil is not suited to tilled crops; it has poor drainage and, during most seasons, heavy farm machinery cannot be used. Pasture is the best use, but if good management is not practiced, undesirable grasses and weeds take over. (Capability unit Vw-1.)

Rock land

Rock land, acidic, moderately steep phase (7 to 25 percent slopes) (RkD).—This land type consists of sloping and moderately steep areas in which outcrops of bedrock and loose stone fragments occur. The rock outcrops, roughly 10 to 30 feet apart, cover 25 to 50 percent of the surface. The soil material between the rock outcrops ranges from a few inches to more than 2 feet deep. This land type is most widespread in the mountainous areas. In the Blue Ridge Mountains, it contains Porters, Ramsey, and Halewood soils. In the mountains of the Piedmont, it contains Brandywine, Hazel, and Louisburg soils.

Rock land, acidic, moderately steep phase, has very poor workability and low productivity. Surface runoff is medium to very rapid; the internal drainage is good to excessive. The fertility and water-holding capacity are low.

Use and suitability.—Approximately 93 percent of this land type is in forest, 5 percent is in pasture, and 2 percent is in orchards. Because of the many stones and rock outcrops, this land is not suited to crops. If management is good, the acreage is fairly well suited to pasture. The areas of this land type that contain Louisburg soils are best suited to forest. They are less fertile and more droughty than areas that include Porters, Ramsey, Halewood, Brandywine, or Hazel soils. (Capability unit VIs-2.)

Rock land, acidic, steep phase (25 to 45+ percent slopes) (RkE).—This land type is in more mountainous areas than Rock land, acidic, moderately steep phase, and is shallower, is more droughty, and has greater runoff and erosion.

Use and suitability.—Most of this land type is in forest, which is its best use. If well managed, the areas underlain by granodiorite might make fair pasture. (Capability unit VIIs-2.)

Rock land, basic, moderately steep phase (7 to 25 percent slopes) (RoD).—This land type consists of sloping and moderately steep areas in which outcrops of greenstone bedrock and loose stone fragments occur. The rock outcrops are roughly 10 to 30 feet apart and cover 25 to 50 percent of the surface. The soil material between these rock outcrops ranges from a few inches to several feet in depth. This land type occurs in the Blue Ridge Mountains in the northwestern part of the county. It contains the Catoctin and Myersville soils. The texture of the surface soil between the rocks is silt loam.

This land type is very poor in workability and is medium in productivity. Surface runoff is medium to very rapid; the internal drainage is good to excessive. The content of organic matter and the natural fertility are moderately high, and the water-holding capacity is low to medium.

Use and suitability.—Approximately 95 percent of this land type is in forest, 3 percent is in pasture, and 2 percent is in orchards. Because of the many stones and rock outcrops, this land is not suited to cultivated crops. Good management, which includes addition of lime and fertilizer and the control of grazing, produces good pasture. (Capability unit VIs-2.)

Rock land, basic, steep phase (25 to 45+ percent slopes) (RoE).—This land type is more shallow and has more rapid runoff than Rock land, basic, moderately steep phase. Erosion on this steep phase is greater, and the water-supplying capacity is lower. All of the acreage is in forest, which is its best use. (Capability unit VIIs-2.)

Rock outcrop

Rock outcrop (7 to 45+ percent slopes) (Rp).—Land on any slope in the county that has outcrops of bedrock and loose stones on more than 90 percent of the surface is mapped as Rock outcrop. It occurs mostly in the mountainous areas and along bluffs of steep streams and is composed of both acidic and basic rocks. The land is not suited to crops and pasture, and although covered by forest vegetation of poor quality, it is not suited to forest. It has some value for protection of wildlife and for watersheds. The vegetation consists of laurel shrubs, grapevines, ferns, mosses, and briers. (Capability unit VIIIs-1.)

Stony alluvial land

Stony alluvial land (0 to 2 percent slopes) (Sa).—This land type is similar to Alluvial land in texture, color, and drainage. It differs in having stones strewn over

the surface and embedded throughout the profile. This land is not overflowed so frequently as Alluvial land and is located closer to the mountains. Because of stoniness, Stony alluvial land is difficult to cultivate, but it is easy to conserve.

Use and suitability.—Approximately 90 percent of this mapping unit is in pasture, 5 percent is in forest, and 5 percent is in crops. The quantity of stones limits use of this land to pasture and trees. It is not suited to cultivation. (Capability unit VIs-3.)

Stony colluvial land

Stony colluvial land (7 to 45 percent slopes) (Sc).—This land type consists of colluvium that contains numerous stones, cobbles, and boulders. The material washed and rolled from the steep, rocky slopes of the Blue Ridge Mountains onto the drainageways below. The land type typically is in long, narrow areas along the floor of the gaps and hollows in the mountains. Stony colluvial land formed in material weathered from greenstone, granodiorite, or a mixture of the two. Its origin depends upon the type of bedrock common to the area in which the colluvium occurs. Stones, cobbles, and boulders cover more than 90 percent of the exposed surface. The land is not suited to crops, pasture, or forest; it has some value for protection of wildlife and for watersheds. Vegetation is sparse. (Capability unit VIIIs-1.)

Stony local alluvial land

Stony local alluvial land consists of gently sloping to moderately steep, brown, well-drained, moderately deep, colluvial materials that have washed and rolled from the soils of the Blue Ridge Mountains. The surface layer is brown to dark-brown loam, and the subsoil is brown to yellowish-brown, weakly developed, light sandy clay loam. This land type is medium acid to strongly acid. It is moderately high in content of organic matter and in natural fertility. Tilth is poor, but the land is easy to conserve.

Stony local alluvial land is extensive along the hollows and in the foothills of the mountains. It is associated with the Unison and Dyke soils, and their parent materials are similar. This land type is less well developed and has less clay throughout the profile than the Unison soils.

The natural vegetation on Stony local alluvial land consists of poplar, white pine, hemlock, dogwood, redbud, and different kinds of oak trees. Most of the acreage is too stony for cultivation, but in some areas stones have been removed. The land is used mostly for pasture and apple orchards. It is well suited to apples and makes excellent gardens.

Stony local alluvial land, gently sloping phase (2 to 7 percent slopes) (StB).—The following describes a profile in an apple orchard, south of State Highway 631 and ¾ mile northeast of State Highway 630:

A_1 0 to 2 inches, dark-brown (7.5YR 3/2), very friable stony loam; moderate, fine, granular structure; few stones; plentiful fine roots; abrupt, smooth boundary.

A_2 2 to 13 inches, dark-brown (10YR 3/3), very friable loam; weak, fine, granular structure; many fine roots; many stones; gradual, smooth boundary.

B_2 13 to 27 inches, brown to dark-brown (7.5YR 4/4), friable, light sandy clay loam; weak, fine, subangular blocky structure; few stones and pebbles; gradual, smooth boundary.

C_1 27 to 35 inches, yellowish-brown (10YR 5/4), very friable sandy loam soil material; contains some grit, a few pebbles, and many stones.

In most of the wooded areas of this land type, a thin, brown to black A_0 horizon has formed. The surface layer is 10 to 25 inches deep. It is mostly loam but is finer textured where greenstone rock dominates. The subsoil ranges from 10 to 25 inches in depth and from brown to yellowish brown in color. The B_2 horizon is weakly developed and ranges from loam to sandy clay loam in texture. In areas where Stony local alluvial land, gently sloping phase, is near the Unison soils, the texture of the B_2 horizon is frequently clay loam. The subsoil is mostly friable to very friable but is slightly sticky when wet. Stones occur throughout the profile, and in most places they increase in number and size as the depth increases. The size and number of stones on the surface vary; farmers have cleared some areas and have used the stones for fences. Included with this land type are small areas of Unison soil and of Stony alluvial land.

The permeability of this land type is rapid. The content of organic matter and the natural fertility are moderately high. This land retains fairly well the fertility gained by applying lime and plant nutrients. The soil materials are normally medium acid to strongly acid. Because of stoniness, tilth is poor, but the land is fairly easy to conserve and produces well.

Use and suitability.—Approximately 50 percent of this mapping unit is in pasture, 20 percent is in forest, and 30 percent is in crops. Pasture on this stony land is shown in figure 11. The acreage is best suited to pasture, fruit trees, and forest. Stoniness limits use for cultivated crops. (Capability unit IVs-1.)

Stony local alluvial land, sloping phase (7 to 14 percent slopes) (StC).—This land type has a slightly thinner surface soil and subsoil than Stony local alluvial land, gently sloping phase. It is more susceptible to erosion and has lost some of its topsoil. The remaining surface layer ranges from 10 to 15 inches in thickness, and the

Figure 11.—Pasture on Stony local alluvial land.

subsoil, from 10 to 20 inches. Both the gently sloping phase and this sloping phase of Stony local alluvial land have a sandy clay loam subsoil, but in this sloping phase the horizon is more definite.

Use and suitability.—Approximately 30 percent of the acreage is in pasture, 10 percent is in crops, and 60 percent is in forest. Pasture, apple orchards, and forest are the best uses. Strong slopes, severe erosion, and stoniness limit use for cultivation. (Capability unit IVs-1.)

Stony local alluvial land, moderately steep phase (14 to 25 percent slopes) (StD).—This land type has a thinner surface soil and subsoil than Stony local alluvial land, gently sloping phase. Its surface layer ranges from 10 to 15 inches in depth, and the subsoil, from 10 to 20 inches. In places, this mapping unit appears to be somewhat older and more developed than Stony local alluvial land, gently sloping phase. All the acreage is stony, but the size and number of stones vary. The texture of the subsoil is a little finer than that of the gently sloping phase, and some areas have a clay loam rather than a sandy clay loam texture.

Use and suitability.—Approximately 85 percent of the acreage is in forest, 10 percent is in pasture, and 5 percent is in crops. This land is best suited to forest, pasture, and apple trees. (Capability unit VIs-1.)

Unison series

The Unison series consists of gently sloping to sloping, brown, well-drained, deep, old colluvial soils that formed in material washed and rolled from soils of the Blue Ridge Mountains. This colluvial material is from weathered greenstone and granodiorite.

The Unison soils have a dark-brown loam surface layer and a reddish-brown to yellowish-red clay loam subsoil. These soils are among the best in the county. They are medium acid. Their organic-matter content and natural fertility are moderately high. Tilth is good, and the soils are easy to conserve.

The Unison soils are extensive in the foothills of the Blue Ridge Mountains, in the western and northwestern parts of the county. Associated with them are the Dyke soils, from which they differ in being less red and in having less clay in the subsoil.

The natural vegetation of the Unison soils consists of hickory, redbud, dogwood, yellow-poplar, black locust, black walnut, black oak, scarlet oak, red oak, and white oak. These soils are suited to all crops commonly grown in the county.

Unison loam, gently sloping phase (2 to 7 percent slopes) (UnB).—The following describes a profile in an alfalfa field, 1¾ miles west of Flint Hill, along State Highway No. 629:

- A_p 0 to 8 inches, brown to dark-brown (10YR 4/3), very friable loam; weak, fine to medium, granular structure; many fine and medium roots; clear, smooth boundary.
- B_1 8 to 18 inches, brown to dark-brown (7.5YR 4/4), friable silty clay loam; weak, fine to medium, subangular blocky structure; few fine roots; clear, smooth boundary.
- B_2 18 to 35 inches, reddish-brown (5YR 4/4), friable clay loam; moderate, medium to fine, subangular blocky structure; slightly sticky and slightly plastic when wet; few patchy clay films; clear, smooth boundary.
- B_3 35 to 43 inches, brown to dark-brown (7.5YR 4/4), friable silty clay loam; weak, fine, subangular blocky structure; slightly sticky when wet; thin patchy clay films; few weathered fragments of rock; clear, smooth boundary.
- C_1 43 to 49 inches +, highly weathered soil material, with shades of yellowish brown, brown, and red; few rounded cobbles and weathered rock fragments.

The surface soil ranges from 4 to 14 inches in depth. It is brown to dark brown, except in old, wooded areas where an A_0 horizon has developed. Here, the soil has a darker color. The brown to reddish-brown subsoil is 18 to 40 inches thick, and in texture it ranges from sandy clay loam to clay. Normally, it is a clay loam. All of this soil is well drained. It varies greatly in content of cobbles and gravel. Included with Unison loam, gently sloping phase, are areas of fine sandy loam and silt loam. Small areas of Dyke loam and of Stony local alluvial land are also included.

Permeability is moderately rapid in the surface soil and moderate in the subsoil. The water-holding capacity is high. The content of organic matter and the natural fertility are moderately high. The capacity to retain fertility gained by applying lime and plant nutrients is high. The soil is medium acid. It is easy to conserve and has good tilth.

Use and suitability.—Approximately 60 percent of this soil is used for crops, 30 percent is in pasture, and 10 percent is in woods. This soil is best suited to corn, alfalfa, hay, and fruit trees. All of the acreage can be cultivated. It is suited to all crops grown in the county. (Capability unit IIe-2.)

Unison loam, eroded sloping phase (7 to 14 percent slopes) (UnC2).—This soil has a slightly thinner surface soil and subsoil than Unison loam, gently sloping phase. In many cultivated fields, some of its surface layer has been removed through accelerated erosion and the subsoil is exposed. The surface soil that remains ranges from 4 to 8 inches in thickness, and the subsoil, from 18 to 30 inches. Small areas have cobbles on the surface and throughout the profile; these areas are indicated on the map by symbols. A few places have shallow gullies, and erosion is active. This sloping soil is more susceptible to erosion than Unison loam, gently sloping phase, and has a slightly lower water-holding capacity. Included with the soil are some areas that have moderately steep relief.

Use and suitability.—Approximately 60 percent of this soil is in pasture, 20 percent is in crops, and 20 percent is in forest. Except on the steeper slopes, all of this soil is suited to corn, small grains, alfalfa, and hay. Fruit trees produce very well on this soil. Longer rotations, more sod crops, contour cultivation, more manure, and more crop residues are necessary on this soil than on the gently sloping phase of Unison loam. (Capability unit IIIe-2.)

Unison loam, gently sloping fragipan variant (2 to 7 percent slopes) (UpB).—The following describes a profile in a cornfield, northwest of State Highway No. 628 and 1 mile northeast of Washington:

- A_p 0 to 8 inches, dark yellowish-brown (10YR 4/4), very friable loam; weak, fine, granular structure; clear, smooth boundary.
- A_3 8 to 10 inches, yellowish-brown (10YR 5/4), friable loam; weak, medium, granular structure; gradual, wavy boundary.

B_1 10 to 13 inches, strong-brown (7.5YR 5/6), friable fine sandy clay loam; weak, fine, subangular blocky structure; clear, smooth boundary.

B_{21} 13 to 18 inches, yellowish-red (5YR 4/6), friable clay loam; moderate, medium, subangular blocky structure; clear, smooth boundary.

B_{22m} 18 to 26 inches, yellowish-red (5YR 4/8), firm clay loam; moderate, medium, angular blocky to thick, platy structure; few distinct mottles of yellowish brown (10YR 5/4); few distinct clay skins; gradual, irregular boundary.

B_{3g} 26 to 37 inches, yellowish-red (5YR 4/8); friable to firm silty clay loam; moderate, medium, angular blocky to medium, platy structure; common, distinct mottles of light olive brown (2.5Y 5/6); few pebbles; common distinct clay skins; clear, smooth boundary.

C_1 37 to 67 inches, weathered granite and granodiorite rock material mixed with some soil material.

C_2 67 inches +, bedded stones, gravel, and cobbles too dense to dig.

The surface soil is 6 to 14 inches deep. In many places the old land surface lies buried in the profile at a depth of about 25 inches. The fragipan varies in depth and thickness; it is mostly 14 to 20 inches deep and is a few inches to several feet thick. When this pan is dry in seasons of little rainfall, it is compact and so hard that roots find it difficult to penetrate. Included with Unison loam, gently sloping fragipan variant, are areas of silt loam and spots of Belvoir loam.

The permeability of this soil is slow to very slow. The content of organic matter and the natural fertility are medium low. The capacity to absorb and retain moisture for plants is medium. This soil is normally strongly acid to medium acid. It has good tilth and is easy to conserve.

Use and suitability.—Approximately 70 percent of this soil is in crops, and 30 percent is in pasture. Although it is suited to most of the crops commonly grown in the county, it is best for lespedeza and small grains. Alfalfa grows well, but yields are lower than those on Unison loam, gently sloping phase. (Capability unit IIe-3.)

Unison cobbly loam, gently sloping phase (2 to 7 percent slopes) (UcB).—This soil has cobbles strewn over the surface and embedded throughout its profile. These cobbles, 2½ to 5 feet apart, cover about 3 to 15 percent of the surface area. Most of them can be removed to make the soil more suitable for cultivation. This soil is intricately associated with Unison loam, gently sloping phase.

Use and suitability.—Approximately 60 percent of Unison cobbly loam, gently sloping phase, is in pasture, 10 percent is in cultivation, and 30 percent is in forest. This soil is best suited to pasture and fruit trees. It is fairly well suited to cultivated crops, but the cobbles interfere with tillage. (Capability unit IIIs-1.)

Unison cobbly loam, sloping phase (7 to 14 percent slopes) (UcC).—This soil has a thinner soil profile than Unison loam, gently sloping phase, and has loose cobbles strewn over the surface and embedded throughout its profile. These cobbles are 2½ to 5 feet apart and cover 3 to 15 percent of the surface. Included with this soil are soils on slopes of 14 to 25 percent. These areas are small, and in some places the original land surface is exposed.

Use and suitability.—Approximately 60 percent of this soil is in forest, 20 percent is in crops, and 20 percent is in pasture. The soil is best suited to forest and pasture. Orchards do well, but there are many cobbles. Except on the steep slopes, this soil is suited to cultivated crops if the farmer uses long crop rotations. (Capability unit IVs-1.)

Figure 12.—Rock outcrops on Very rocky land.

Very rocky land

Very rocky land (14 to 45+ percent slopes) (Ve).—This miscellaneous land type contains loose stones and has rock outcrops, 10 feet apart or less, that cover 50 to 90 percent of the surface area (fig. 12). The Myersville, Porters, and Halewood soils occur with the granodiorite and greenstone rocks; Louisburg and Brandywine soils occur with sandstone and granite. There is no purpose in mapping these soils separately, for all are too stony.

Most of Very rocky land is in the Blue Ridge Mountains. All of the acreage is in forest and should not be cleared. It is too rough and rocky for cultivation or pasture. The understory of vegetation on which wildlife feed varies somewhat with the basic or acidic reaction of the rocks. The vegetation that grows in the areas where there are basic rocks seems to attract more wildlife than does the vegetation in areas where the rocks are acidic. (Capability unit VIIIs-1.)

Wehadkee series

The Wehadkee series consists of nearly level, gray, poorly drained, deep soils of the first bottoms. They formed in alluvial material that washed from the soils of the Piedmont Plateau and the adjacent mountains. These soils have a mottled silt loam surface layer and a highly mottled, gray, brown, and yellow silty clay to clay subsoil. The soils are medium acid. They are low in organic-matter content and are moderately high in natural fertility. Tilth is poor, but the soils are easy to conserve. Surface runoff is slow to very slow; the internal drainage is very slow. In addition to being flooded frequently by adjacent streams, the soils, in places, receive runoff water from the adjoining upland slopes.

The Wehadkee soils are extensive along the streams in the county. Associated with them are Congaree and Chewacla soils, which they resemble in mode of formation and in kind of parent material. The Wehadkee soils

differ from the Congaree and Chewacla soils in being poorly drained.

The natural vegetation of the Wehadkee soils consists of oak, buttonbush, smooth alder, sycamore, river birch, elm, and willow. The acreage is used mainly for pasture. Yields are low for most grasses except fescue.

Wehadkee silt loam (0 to 2 percent slopes) (We).—The following describes a profile in a pasture containing swamp grasses, ½ mile north of the junction of State Highways 729 and 618, along Little Battle River:

1 0 to 8 inches, dark-brown (10YR 4/3), friable silt loam; few, faint mottles of gray (5Y 5/1); moderate, fine, granular structure; gradual, smooth boundary.
2 8 to 23 inches, dark-brown (10YR 4/3), friable silty clay loam; common, distinct mottles of dark gray (5Y 4/1); moderate, fine, subangular blocky structure; few fine mica flakes; slightly plastic when wet; clear, smooth boundary.
3 23 to 30 inches, grayish-brown (2.5Y 5/2), plastic silty clay; common, distinct mottles of light olive brown (2.5Y 5/6); moderate, medium, columnar structure or massive (structureless); few fine mica flakes; gradual, wavy boundary.
4 30 to 42 inches, dark-gray (5Y 4/1), plastic clay; common, distinct mottles of dark yellowish brown (10YR 4/4); coarse, columnar structure or massive (structureless).

The surface soil ranges from 6 to 14 inches in thickness and from very fine sandy loam to heavy silt loam in texture. The color of the surface soil is brown, grayish brown, yellowish brown, or dark brown mottled with gray. The subsoil varies from fine sandy clay loam to clay, but it is mostly silty clay loam or silty clay. This soil normally is on the nearly level flood plains and has mottlings at, or very near, the surface. Crayfish holes and mounds are numerous, especially in the wet, depressional areas.

The permeability of this soil is slow to very slow. The soil is medium acid to strongly acid. It is moderate to low in organic-matter content and is medium to high in fertility. The soil is permeable to water and has a high water-supplying capacity, but during most of the year, a high water table and poor aeration restrict the intake of plant nutrients and prevent penetration of plant roots and movement of air. The soil is hard to work but easy to conserve.

Use and suitability.—Approximately 50 percent of this soil is in forest, 45 percent is in pasture, and 5 percent is in crops. Because it is poorly drained, this soil is not suited to tilled crops. It is frequently flooded, and good tillage is almost impossible to maintain. The use of heavy farm machinery is prohibited. When drained, improved permanent pasture and corn can be grown with moderate returns. (Capability unit IVw-1.)

Wickham series

The Wickham series consists of gently sloping, brown, well-drained, deep soils of the terraces. They formed in material washed from the soils of the Piedmont Plateau and the adjacent mountains. These soils have a brown to dark-brown loam surface layer and a brown to yellowish-brown, friable clay loam subsoil. The soils are medium acid. They are moderately high in organic-matter content and in natural fertility. Tilth is good, and the soils are easy to conserve.

The Wickham soils are inextensive and are only on the benches of the terraces along the large streams in the county. Associated with them are the Altavista, Augusta, and Roanoke soils, which they resemble in mode of formation and in kind of parent material. The Wickham soils differ from the associated soils in occupying a higher position on the slopes, in being well drained, and in having a browner color throughout the profile.

The natural vegetation of the Wickham soils consists of white oak, red oak, black oak, poplar, and pine. Most of the acreage has been cleared and is used for corn, small grains, and hay. It is well suited to the crops commonly grown in the county.

Wickham loam, gently sloping phase (2 to 7 percent slopes) (WnB).—The following describes a profile in a hayfield containing lespedeza, along State Highway No. 231, ¾ mile north of State Highway No. 618:

A_p 0 to 10 inches, dark-brown (7.5YR 3/2), very friable loam; moderate, fine to medium, granular structure; few fine roots; few polished grains of sand; abrupt, smooth boundary.
B_2 10 to 38 inches, brown to dark-brown (7.5YR 4/4), friable silty clay loam; moderate, medium, subangular blocky structure; slightly sticky and slightly plastic when wet; few polished grains of sand; few fine roots in the upper 3 inches; few patchy clay films; gradual, wavy boundary.
B_3 38 to 52 inches, yellowish-red (5YR 4/8), brown to dark-brown (7.5YR 4/4), and strong-brown (7.5YR 5/6), friable clay loam; weak, fine to medium, subangular blocky structure; few polished grains of sand; few angular and subangular cobbles; gradual, wavy boundary.
C_1 52 to 70 inches, yellowish-brown (10YR 5/6) and yellowish-red (2.5YR 5/6), friable, light fine sandy clay loam soil material mixed with highly weathered rock material; numerous quartz fragments and a few cobbles.

The surface soil ranges from 4 to 14 inches in thickness and from brown to dark brown in color. The subsoil ranges from 30 to 80 inches in thickness and from clay loam or silty clay loam to clay in texture. The subsoil commonly is brown to yellowish brown, but in some spots it is yellowish red or brownish red.

Included with Wickham loam, gently sloping phase, is about 100 acres of Wickham loam, sloping phase, and about 15 acres of Wickham loam, nearly level phase. In some areas, especially on the sloping phase, cobbles are strewn over the surface soil. Small areas of silt loam and fine sandy loam are also included.

The permeability of Wickham loam, gently sloping phase, is moderate. The content of organic matter and the natural fertility are moderately high. The soil is medium in its ability to retain fertility gained by adding lime and fertilizer. Both surface runoff and internal drainage are medium; the water-holding capacity is moderate. The soil is normally medium acid. It has good tilth and is easy to conserve. It is easy to work within a wide range of moisture content.

Use and suitability.—Approximately 85 percent of this soil is used for crops, 10 percent is in pasture, and 5 percent is in forest. This soil is well suited to all crops commonly grown in the county. (Capability unit IIe-2.)

Worsham series

The Worsham series consists of nearly level to gently sloping, gray, poorly drained, deep soils of the uplands. They formed in local alluvial and colluvial materials and are in depressions at the heads of drainageways and

at the bases of slopes. These soils have a mottled, gray silt loam surface layer and a highly mottled, yellow and gray clay subsoil. The soils are strongly acid. They are medium in organic-matter content and low in natural fertility. Tilth is poor, but the soils are easy to conserve.

The Worsham soils are extensive throughout the Piedmont Plateau. They are associated with the Belvoir and Meadowville soils. From these soils they differ in being poorly drained, in having a high water table, and in having a heavy, plastic subsoil.

The natural vegetation on the Worsham soils consists of willow oak, scarlet oak, red maple, alder, hazelnut, elm, and other water-tolerant plants. The soils are used mostly for pasture, but they are poor for this use and are poor for all cultivated crops.

Worsham silt loam (0 to 7 percent slopes) (Wo).—The following describes a profile in a pasture containing swamp grasses, ¼ mile south of the junction of U.S. Highway No. 522 and State Highway No. 622, along No. 622:

A_p 0 to 4 inches, grayish-brown (2.5Y 5/2), very friable silt loam; few, faint mottles of light brownish gray (2.5Y 6/2); weak, fine, granular structure; many fine roots; gradual, smooth boundary.

A_2 4 to 8 inches, light brownish-gray (2.5Y 6/2), friable silt loam; few, distinct mottles of brownish yellow (10YR 6/6); weak, fine, granular structure; few quartz fragments; gradual, smooth boundary.

B_{1g} 8 to 13 inches, gray (5Y 5/1), firm clay loam; common, distinct mottles of light olive brown (2.5Y 5/6) and yellowish brown (10YR 5/4); weak, medium, angular blocky structure; few concretions; few patchy clay skins; gradual, wavy boundary.

B_{2g} 13 to 27 inches, gray (5Y 6/1), firm clay; distinct mottles of yellowish brown (10YR 5/6); weak, coarse, angular blocky structure; plastic and sticky when wet; common clay skins; few quartz fragments; gradual, wavy boundary.

B_{3g} 27 to 36 inches, light-gray (5Y 7/1), friable to firm sandy clay loam; few, distinct mottles of yellowish brown (10YR 5/8); moderate, medium, angular blocky structure; slightly sticky and plastic when wet; few quartz pebbles; gradual, wavy boundary.

C_1 36 to 42 inches +, gray, coarse sandy loam soil material with numerous blue and white quartz pebbles.

The surface soil ranges from 6 to 15 inches in thickness and from mottled light gray or grayish brown to gray in color. In most places the surface soil is mottled, but a few areas have a thin, recently accumulated layer of soil that does not show mottling. The subsoil is highly mottled and ranges from sandy clay loam to clay. Included with Worsham silt loam are areas of Belvoir soil and some wet, poorly drained spots of old colluvial soils that are normally associated with Unison loam.

Permeability is moderate to slow in the surface soil and very slow in the subsoil. The acreage has a high water table and is poorly drained. As a result, aeration is poor and permeability to water and roots is low. Even in seasons of normal rainfall, water stands on the surface. The soil is strongly acid. It is medium in organic-matter content and low in natural fertility. Tilth is moderately good, but runoff of surface water is slow. The soil is damaged if worked when wet. The areas are poorly accessible to farm machinery.

Use and suitability.—Approximately 60 percent of this soil is in pasture, 10 percent is in crops, and 30 percent is in forest. The soil is best suited to pasture. Some crops can be grown if the soil is well managed and is artificially drained. (Capability unit Vw-1.)

Worsham stony silt loam (0 to 7 percent slopes) (Ws).—This soil has stones strewn over the surface and throughout the profile. Most of this soil is old colluvium that has washed from greenstone and granodiorite. There are enough stones to make use of all farm machinery impracticable. These stones, 2½ feet or less apart, cover 15 to 90 percent of the surface.

Use and suitability.—Approximately 90 percent of this soil is in forest, and 10 percent is in pasture. Forest is the best use; the pasture is of poor quality. (Capability unit VIIs-3.)

General Soil Map

In mapping a county or other large tract, it is fairly easy to see definite changes as one travels from place to place. There are many obvious changes, among them changes in shape, gradient, and length of the slopes; in the course, depth, and speed of streams; in the width of the bordering valleys or levees; in the kinds of native plants; and even in the kinds of agriculture. With these more obvious changes there are less easily noticed changes in the patterns of soils. The soils change along with the other parts of the environment.

By drawing lines around the different patterns of soils on a small map, one may obtain a map of the general soil areas, or, as they are called in this report, soil associations. Such a map is useful to those who want only a general idea of the soils, who want to compare different parts of a county, or who want to locate large areas suitable for some particular kind of agriculture or other broad land use. The map is at too small a scale to be used in planning management for any one particular farm.

The thirteen soil associations, or kinds of soil patterns, in Rappahannock County are shown on the colored map at the back of this report. The legend on this map shows that several soil associations that are dominated by soils similar in some characteristics may be shown by the same color. Thus, soil associations 1 and 2, which are areas dominated by soils with a light-colored surface soil and a reddish or yellowish acid clay subsoil are in light yellow.

Soil association 1

Moderately deep and shallow, well-drained and rapidly drained soils on sloping to steep dissected Piedmont uplands: Louisburg, Albemarle, and Culpeper soils

This soil association makes up about 13.9 percent of the county, or 23,760 acres. Most of it occurs in the eastern part of the county, in a belt ½ to 3 miles wide that extends the entire length of the county from the Hughes River to the Rappahannock River. Several small areas are around Five Forks. The area is highly dissected by intermittent and permanent streams, and the drainageways are closer together than in the other soil associations. Most of the association is in sloping and moderately steep areas, but some of it occurs on broad and narrow ridgetops.

The Louisburg soils, which make up about 42 percent of the acreage, occupy sloping, moderately steep, and steep areas that slope toward the drainageways. These

soils are shallow and excessively drained. They formed in material weathered from arkosic sandstone, quartzite, and phyllite. They have a grayish-brown sandy loam surface layer, but the subsoil shows little or no development. The Louisburg soils are very strongly acid to extremely acid and are very low in organic-matter content and in natural fertilty. They have good tilth but are poor for crops.

The Albemarle soils, which make up roughly 30 percent of the association, occur on narrow ridges in gently sloping and sloping areas. These soils are moderately deep and well drained. They formed in material weathered from arkosic sandstone, quartzite, and phyllite. They have a grayish-brown fine sandy loam surface layer and a yellowish-red clay loam subsoil. The Albemarle soils are strongly acid and are low in organic matter and in natural fertilty. They have good tilth within a wide range of moisture content and are fairly well suited to most crops grown in the area.

The Culpeper soils occupy roughly 18 percent of this association. They occur mostly on gently sloping and sloping ridgetops, but some areas along the drainageways are moderately steep. These soils are moderately deep to deep and are well drained. They formed in material weathered from arkosic sandstone, quartzite, and phyllite. The Culpeper soils have a grayish-brown loam surface layer and a red clay subsoil. They are very strongly acid and are medium to low in organic-matter content and in natural fertilty. The soils have good tilth and are fairly well suited to the crops commonly grown in the county.

Also in this association are Meadowville, Worsham, Hazel, and Belvoir soils and some miscellaneous land types. These make up about 10 percent of the total area.

Roughly 50 percent of this association is in woods, 20 percent is in crops, and 30 percent is in pasture. The main crops are corn, small grains, and alfalfa and other hay. About 58 percent of the association is suitable for cultivation. Farming is mostly general, but beef cattle are important and there are some dairy farms. Fox, squirrel, quail, deer, some grouse and turkey, and other wildlife live in the area; fish are in the streams.

Soil association 2

Deep and moderately deep, well-drained to somewhat poorly drained soils on nearly level to gently sloping stream terraces: Wickham, Augusta, and Altavista soils

This soil association occupies about 0.6 percent of the county, or 1,030 acres. Most of it is on nearly level and gently sloping terrace benches, just above the flood plains of the large rivers. Fairly large areas are along the Hazel River and along the Thornton River near Sperryville. Smaller areas occur along most other rivers that flow through the county.

The Wickham soils occupy about 40 percent of this soil association. Most of the acreage of these soils is in gently sloping areas that grade toward the streams. Wickham soils are deep and well drained. They are on terraces and formed in material that washed from the soils of the Piedmont Plateau and the adjacent mountain regions. These soils have a brown to dark-brown surface layer and a brown to yellowish-brown subsoil. They are medium acid and are moderately high in organic-matter content and in natural fertility. Tilth is good, and the soils are among the best in the county for most crops.

The Augusta soils make up about 32 percent of the association. These soils are moderately deep and moderately well drained to somewhat poorly drained. They are on terraces and formed in material washed from the soils of the Piedmont Plateau and the adjacent mountain regions. The Augusta soils have a grayish-brown surface layer and a mottled, brown and gray subsoil. Reaction is strongly acid. These soils are medium to low in content of organic matter and in natural fertility. They have good tilth and are used mostly for pasture and hay.

The Altavista soils make up about 18 percent of this association. These soils are moderately deep and well drained to moderately well drained. They are in nearly level areas on terraces and formed in material washed from the soils of the Piedmont Plateau and the adjacent mountain regions. Altavista soils have a light yellowish-brown loam surface soil and a yellowish-brown clay loam subsoil. The soils are strongly acid and are medium in content of organic matter and in natural fertility. They have good tilth and are used for most crops commonly grown in the county.

The rest of this association—about 10 percent of the total area—consists of Roanoke, Congaree, Chewacla, Hiwassee, and some areas of Brandywine soils.

About 73 percent of this association is in crops, 25 percent is in pasture, and 2 percent is in forest. The main crops are corn, small grains, and hay. On parts of large farms in this association beef cattle are raised. There is one dairy farm.

Soil association 3

Deep and moderately deep, well-drained soils on gently to moderately sloping old colluvial slopes: Stony local alluvial land, Unison, and Dyke soils

This soil association occupies about 6 percent of the county, or 10,250 acres. It is on the eastern side of gently sloping to moderately sloping old colluvial fans. It occurs in long, narrow areas that may be as much as 2½ miles wide. The largest area is northwest of Flint Hill. Several smaller areas, as much as 1 mile wide, are along the floors of gaps and hollows in the Blue Ridge Mountains.

Stony local alluvial land makes up about 39 percent of this association. Most of it is gently sloping to sloping, but some is moderately steep. Loose cobbles and stones, 2½ to 5 feet apart, cover 3 to 15 percent of the surface area. The soil material in Stony local alluvial land has a brown to dark-brown loam surface layer and a brown to yellowish-brown, weakly developed, light sandy clay subsoil. It is well drained and medium acid to strongly acid. The content of organic matter and the natural fertility are high. The soils developed in material that has washed or rolled from areas of greenstone and granodiorite. Because this land is stony, tilth is poor and the use of farm machinery is difficult.

The Unison soils make up about 24 percent of this association. These soils are mainly in gently sloping and sloping areas. They are deep and well-drained soils on

old colluvium. They formed in material washed from the Blue Ridge Mountains. The Unison soils have a dark-brown surface layer and a reddish-brown to yellowish-red clay loam subsoil. These soils are medium acid and are moderately high in content of organic matter and in natural fertility. About 20 percent of the acreage has cobbles, 2½ to 5 feet apart, that cover 3 to 15 percent of the surface area. All of the noncobbly Unison soils have good tilth and are suited to crops. The cobbly soils are best suited to pasture and orchards.

The Dyke soils make up about 24 percent of this association. They occur mostly on the eastern side of gently sloping and sloping areas. These soils are deep and well drained. The old colluvium in which they formed washed and rolled from areas of greenstone. The Dyke soils have a dark reddish-brown to reddish-brown loam surface layer and a dark-red clay subsoil. Both the surface layer and the subsoil are slightly sticky and slightly plastic when wet. These soils are medium acid to slightly acid and are high in content of organic matter and in natural fertility. They have good tilth and are among the best soils in the county.

Also in this association is Stony colluvial land, which makes up about 13 percent of the total area. Most of it is in long, narrow areas along the floors of gaps and hollows in sloping and moderately steep areas. Stones, cobbles, and boulders cover more than 90 percent of the surface area. The association also has small areas of Worsham, Belvoir, Brandywine, and other soils.

About 41 percent of this association is in forest, 32 percent is in crops or fruit trees, and 27 percent is in pasture. The main crops are corn, small grains, alfalfa and other hay, and apples. The orchards are operated by their owners or are rented by the year. The pasture is native bluegrass of good quality or orchardgrass and ladino clover.

Soil association 4

Deep well-drained soils on gently sloping and sloping stream terraces, and shallow rapidly drained soils on adjoining steep uplands: Hiwassee and Brandywine soils

This soil association occupies about 1.4 percent of the county, or 2,390 acres. Most of it is on the sloping and gently sloping parts of old terraces that have moderately steep slopes and that occur along drainageways. The largest areas are along the Hughes and Hazel Rivers. Another area is along the Thornton River east of Sperryville.

The Hiwassee soils make up about 70 percent of this soil association. These soils are deep and well drained. They formed in gently sloping and sloping areas in old alluvium that washed from the soils of the Piedmont Plateau and Blue Ridge Mountains. Hiwassee soils have a dark-brown to dark reddish-brown surface layer and a dark-red subsoil. They are medium acid to very strongly acid and are high in content of organic matter and in natural fertility. These soils have good tilth but can only be worked within a narrow range of moisture content. Nevertheless, they are among the best soils in the county and produce all of the crops commonly grown. They are excellent for peaches.

The Brandywine soils make up roughly 28 percent of the soil association. These soils are shallow and somewhat excessively drained. They are on uplands on moderately steep breaks along drainageways where they formed in material weathered from granite and granodiorite. The surface layer is brown, and there is litttle or no subsoil development.

The Meadowville, Eubanks and Lloyd, and Chester soils occupy the remaining 2 percent of the soil association.

Roughly 55 percent of this association is in crops, 40 percent is in pasture, and 5 percent is in forest. The main crops are apples, peaches, corn, small grains, and alfalfa and other hay. Several small farms are in soil association 4, but most of the acreage consists of parts of large farms. Because of the small amount of woodland, there is little wildlife. A few animals and birds feed on farm crops and pasture.

Soil association 5

Shallow and moderately deep, well-drained and somewhat rapidly drained soils on sloping and gently sloping dissected Piedmont uplands: Brandywine, Eubanks and Lloyd, and Chester soils

This soil association occupies about 31.8 percent of the county, or 54,340 acres. It is mostly sloping and gently sloping, but there are some moderately steep areas along bluffs of streams and on some of the slopes of the mountains in the Piedmont. The area is well defined and strongly dissected by intermittent and permanent streams. This association extends from the Hughes River on the Madison County line through the central part of the county to the Rappahannock River. This belt ranges from 1 to 6 miles in width.

The Brandywine soils make up roughly 50 percent of this association. These soils are in areas that slope toward the drainageways. They are mostly in moderately steep and sloping areas, but some areas on mountainsides are steep. These soils are shallow and somewhat excessively drained. They formed in materials weathered from granite and granodiorite. The surface layer is brown to dark brown. In places the subsoil is yellowish brown though there is generally little or no subsoil development. The Brandywine soils are medium acid to very strongly acid. They contain a medium amount of organic matter and are medium in natural fertility. They have good tilth and are easy to work within a wide range of moisture content, but they are only fairly well suited to crops.

The Eubanks and Lloyd soils, which occupy about 22 percent of the soil association, are on broad and narrow ridgetops, mostly in gently sloping and sloping areas. A few areas are on moderately steep slopes. These soils are deep to moderately deep and well drained. They occur on the uplands in the Piedmont and formed in material weathered from granodiorite and granite. They have a brown to reddish-brown surface layer and a red to dark-red subsoil. These soils are medium acid to very strongly acid and are medium in organic-matter content and in natural fertility. They have good tilth and produce most crops commonly grown in the area.

The Chester soils occupy about 18 percent of the association. These soils are gently sloping and sloping and

occur on ridgetops. They are mostly in the northern part of the association, but some areas are in the southern part. Chester soils are moderately deep and well drained. They formed in material weathered from granite and granodiorite. Their surface layer is brown to dark brown, and the subsoil is strong brown. These soils are medium acid to very strongly acid. They are medium in organic-matter content and are fairly high in natural fertility. They have good tilth and can be worked within a wide range of moisture content. They are well suited to all crops commonly grown in the county.

The remaining 10 percent of this association consists of Meadowville, Belvoir, Worsham, and other soils.

This association is in the main farming area of the county. Roughly 49 percent of the acreage is in pasture, 34 percent is in crops, and 17 percent is in forest. The pasture consists of bluegrass, orchardgrass, and ladino clover. About half of the area is suited to cultivation. Most farmers own their land. Farms that raise beef cattle and grow apples predominate, but there are several chicken farms, dairy farms, and other types of farms. All field crops are fed to livestock.

Soil association 6

Shallow and moderately deep, well-drained and somewhat rapidly drained silt loam soils on sloping and moderately steep Piedmont uplands: Brandywine and Chester soils

This soil association occupies about 0.7 percent of the county, or 1,195 acres. Most of it is sloping and moderately steep, but some is gently sloping. The soils are erodible, and their parent material weathers deeply. The association occurs in the eastern part of the county south of Ben Venue, in a belt ¼ to ½ mile wide that extends in a northeast to southwest direction.

The Brandywine soils, which make up about 75 percent of the association, are sloping and moderately steep. These soils are brown, shallow, and somewhat excessively drained. They formed in material weathered from crushed or sheared granite and granodiorite. They have a brown silt loam surface layer and little or no subsoil development. The Brandywine soils are medium acid to very strongly acid and are medium in content of organic matter and in natural fertility. They have excellent tilth but are erodible. They are used mostly for pasture.

The Chester soils occupy about 18 percent of the soil association. Most of them are on narrow ridges in gently sloping and sloping areas. These soils are moderately deep and well drained. They formed in material weathered from crushed or sheared granite and granodiorite. They have a brown loam or silt loam surface layer and a strong-brown silty clay loam subsoil. These soils are medium acid to very strongly acid in reaction, medium in organic-matter content, and fairly high in natural fertility. They are among the best soils in the county and are used for all crops commonly grown.

The remaining 7 percent of this association consists of Meadowville soils, Eubanks and Lloyd soils, Brandywine loam, and small areas of Culpeper and Albemarle soils.

Roughly 55 percent of the association is in pasture, mainly native bluegrass; 22 percent is in crops, mainly corn, small grains, and hay; and 23 percent is in forest.

Soil association 7

Shallow, rapidly drained, gritty loam soils on sloping and gently sloping Piedmont uplands: Brandywine gritty loam soils

This soil association occupies about 5.5 percent of the county, or 9,395 acres. It consists mostly of broad, gently sloping and sloping areas on the Piedmont uplands, but some moderately steep areas are along the bluffs of streams. The association is strongly dissected by intermittent and permanent streams. It is in the eastern and southern parts of the county, in a belt ¾ to 2 miles wide that extends from Castleton northeastward to the Rappahannock River.

The Brandywine gritty loams, which make up about 85 percent of the soil association, are sloping and gently sloping. These soils are shallow and excessively drained. They formed in material weathered from Old Rag granite, a coarse-textured rock high in quartz. The Brandywine gritty loams are strongly acid and are low in content of organic matter and in natural fertility. Their brown surface layer contains many gritty particles of quartz, but their subsoil shows little or no development. These soils are open and porous and have good tilth, but they are only fair for crops.

The remaining 15 percent of the soil association consists of the Meadowville, Belvoir, and Worsham soils; the Chester-Brandywine, Eubanks-Brandywine, and Eubanks-Chester complexes; and other soils.

Roughly 60 percent of this association is in forest; 15 percent is in crops, mainly corn, small grains, and hay; and 25 percent is in pasture. Very little of the acreage is suited to cultivation. Pasture is normally good, but during dry periods it is poor. Although several farms in the area are large, most of them are of average size and contain other soils better suited to crops than Brandywine gritty loams. Very little wildlife is in this area, but there are a few deer and fox.

Soil association 8

Shallow, rapidly drained, stony soils on steep slopes of low Piedmont mountains: Louisburg and Hazel soils

This soil association makes up about 2.5 percent of the county, or 4,270 acres. Most of it is on steep and moderately steep slopes on mountains in the Piedmont Plateau that are 900 to 1,500 feet above sea level. The areas are small and occur near Scrabble. They are ¼ to 1 mile wide and are scattered over an area about 4 miles wide and 12 miles long. Many loose stones and rock outcrops are in the area.

The Louisburg soils, which make up about 55 percent of the acreage, occur on steep and moderately steep slopes. These soils are stony, shallow, and excessively drained. They formed in material weathered from arkosic sandstone, quartzite, and phyllite. They have a grayish-brown sandy loam surface layer but little or no subsoil development. Loose stones, about 2½ to 5 feet apart, cover 3 to 15 percent of the surface area. The Louisburg soils are very strongly acid to extremely acid and are very low in content of organic matter and in natural fertility. They have poor tilth and are poorly suited to crops.

The Hazel soils, which make up about 30 percent of the association, occur on moderately steep and steep slopes. These soils are brown, stony, and excessively drained. They formed in material weathered from phyllite and from a mixture of sandstone and granite. They have a dark-brown loam surface layer and little or no subsoil development. They are strongly acid and have a fairly low content of organic matter and natural fertility. Tilth is poor, and crops are poorly suited.

The Meadowville, Culpeper, Albemarle, and Worsham soils and a few areas of colluvial and alluvial soils make up roughly 15 percent of the acreage.

About 80 percent of the association is in forest, 15 percent is in pasture, and 5 percent is in crops; roughly 10 percent could be cropped. Only parts of farms are in this association.

Soil association 9

Shallow, rapidly drained, stony soils and rock land on moderately steep and steep slopes of low Piedmont mountains: Brandywine soils and Rock land, acidic

This soil association occupies about 11.2 percent of the county, or 19,140 acres. It is mostly on all sides of the low Piedmont mountains, which are 900 to 1,500 feet above sea level. These mountains are most prominent near Woodville, but they occur throughout the Piedmont Plateau.

Brandywine stony loams, mainly the moderately steep and steep phases, make up about 60 percent of this association. Loose stones, 2½ to 5 feet apart, cover 3 to 15 percent of the surface area. Brandywine soils are shallow and somewhat excessively drained. They formed in material weathered from granite and granodiorite. They have a brown to dark-brown surface layer and little or no subsoil development. Reaction is medium acid to strongly acid. The content of organic matter and the natural fertility are medium. Because they are stony, these soils are difficult to cultivate. Their best use is pasture and forest.

Rock land, acidic, makes up about 30 percent of the association. This land type is mostly on steep mountainsides and stream bluffs. Loose stones and outcrops of bedrock, roughly 10 to 30 feet apart, cover 25 to 50 percent of the surface area. The remaining 10 percent of the association consists of Brandywine loam, Brandywine rocky loam, and a few areas of Chester, Eubanks, and Lloyd soils.

About 80 percent of this association is in forest, 2 percent is in orchards, and 18 percent is in pasture of bluegrass and wild grasses. In this association are wooded parts of large farms that supply timber for farm use. Gray squirrel, raccoon, grouse, quail, rabbit, deer, red fox, and gray fox inhabit the area.

Soil association 10

Deep to moderately deep, moderately well drained to poorly drained soils on first bottoms: Alluvial land, Chewacla, and Wehadkee soils

This soil association makes up about 2.2 percent of the county, or 3,760 acres. All of it is in nearly level areas on the flood plain along creeks and rivers. The largest areas occur along the Hughes, Thornton, Hazel, Covington, and Jordan Rivers.

Alluvial land makes up about 45 percent of this soil association. This land type consists of a mixture of young soils that do not have distinct profile development. These soils formed in recent alluvium that washed from soils of the Piedmont Plateau and adjacent mountains. They have varied texture and drainage. This land type is frequently flooded. Some areas have loose cobbles and stones on the surface and throughout the profile. The stones are 2½ to 15 feet apart and cover 3 to 15 percent of the surface area. The stony areas are closer to the foothills than the nonstony areas and are not flooded so often. This land is medium acid and low in content of organic matter and natural fertility. Because of stoniness and variable drainage, tilth is poor.

The Chewacla soils make up about 35 percent of this association. These soils are deep and moderately well drained to somewhat poorly drained. They formed in alluvial material that washed from soils of the Piedmont Plateau and adjacent mountain regions. They have a brown to yellowish-brown silt loam surface layer and a mottled gray, yellow, and brown subsoil. Chewacla soils are medium acid to strongly acid. Their content of organic matter and natural fertility are fairly high. Tilth is good within a wide range of moisture content and is fairly easy to maintain.

The Wehadkee soils occupy about 15 percent of this association. These soils are poorly drained, deep, and were formed in alluvial material that washed from the soils of the Piedmont Plateau and adjacent mountain regions. They have a gray mottled silt loam surface layer and a highly mottled silty clay to clay subsoil. Reaction is medium acid. The content of organic matter is low, and the natural fertility is moderately high. In addition to being flooded frequently by adjacent streams, Wehadkee soils receive runoff water from adjoining upland slopes. Tilth is poor because the water table is high. Congaree fine sandy loam, Buncombe loamy fine sand, and some areas of Riverwash occupy about 5 percent of this soil association.

About 53 percent of the acreage is in pasture, 30 percent is in crops, and 17 percent is in forest. The pasture is both native and improved. The native pasture is mostly bluegrass, whereas the improved pasture consists of orchardgrass, fescue, ladino clover, and some lespedeza. Most of the cropland is in corn and hay crops, but some is in small grains. This association is the habitat for gray squirrel, groundhog, muskrat, fox, some wood duck, and other wildlife. In the streams are pickerel, smallmouth and large-mouth bass, rock bass (striped bass), suckers, carp, sunfish, and other fish.

Soil association 11

Shallow and moderately deep, rapidly drained and well-drained rocky soils on moderately steep and steep mountain foothills underlain mainly by granodiorite: Rock land, acidic, Halewood soils, and Very rocky land

This soil association makes up 5.4 percent of the county, or 9,230 acres. Most of it is on steep, east-facing slopes of mountains and is strongly dissected by intermittent and permanent streams. This association is in the western part of the county, in a belt ½ to 2½ miles wide that extends along the mountain foothills west of Sperryville northeastward to a point about 1 mile north

of the Jordan River. Some of this association is in the Shenandoah National Park.

Rock land, acidic, occurs throughout this association and makes up about 55 percent of the total area. Most of it is on steep and moderately steep slopes. Loose stones and outcrops of granodiorite, roughly 10 to 30 feet apart, cover 25 to 50 percent of the surface area. This land type also includes small spots of Halewood, Eubanks, Lloyd, Myersville, Porters, Catoctin, and Brandywine soils.

The Halewood soils are on broad foothill ridges in sloping and moderately steep areas. They make up 30 percent of the association. These soils are stony and have a dark-brown to yellowish-brown fine sandy loam surface layer and a yellowish-red to strong-brown sandy clay loam subsoil. They are well drained and strongly acid. Their content of organic matter and natural fertility are medium. Stones, 2½ to 5 feet apart, cover 3 to 15 percent of the surface area. These stones make cultivation, particularly with farm machinery, difficult.

Very rocky land makes up about 15 percent of this association. Most of this land type is on steep to moderately steep slopes. Loose stones and outcrops of granitic rock, 10 feet apart or less, cover 50 to 90 percent of the surface area.

Approximately 89 percent of this association is in forest, 6 percent is in pasture, and 5 percent is in crops. All of the cropland is used to produce apples; none of the acreage is suited to tilled crops. Parts of large farms are in this association, but very few farms are wholly within it. Because this association borders the national park, its land is desired as sites for summer homes. Grouse, gray squirrel, fox, rabbit, quail, and other wildlife are plentiful in some sections. The larger streams in this association are stocked annually with trout.

Soil association 12

Shallow and moderately deep, excessively drained rocky and stony soils on steep mountain slopes underlain mainly by granodiorite: Very rocky land, Rock land, acidic, and Porters soils

This soil association makes up about 10.1 percent of the county, or 17,250 acres. Most of it is on steep, east-facing mountain slopes and is strongly dissected by intermittent and permanent streams. Many permanent streams in the area have their source in springs in this association. The association is in the western and northwestern parts of the county. Most of it is in the Shenandoah National Park.

Very rocky land makes up about 45 percent of this association. Most of this land type occurs on steep and moderately steep slopes in narrow strips on bluffs adjacent to some drainageways. A few small areas are on milder slopes. Loose stones and outcrops of granodiorite, 10 feet apart or less, cover 50 to 90 percent of the surface area. The Porters and Halewood soils occur between the rocks.

Rock land, acidic, makes up about 36 percent of this association. Most of this land type occurs throughout the association on steep and moderately steep slopes, but a few areas are on milder slopes. Loose stones and outcrops of granodiorite, roughly 10 to 30 feet apart, cover 25 to 50 percent of the surface area. The soil material between the rocks is a few inches to several feet deep. Small areas of Porters and Halewood soils are included with Rock land, acidic.

Porters soils make up about 17 percent of the association. These soils occur mostly on broad ridges in sloping and moderately steep areas, but some areas are gently sloping. All of the acreage is stony, and the stones, 2½ to 5 feet apart, cover 3 to 15 percent of the surface area. Porters soils have a very dark brown loam surface layer and a strong-brown sandy clay loam subsoil. They are strongly acid, high in organic matter, and high in natural fertility. They are moderately deep and well drained. These soils formed in material weathered from granodiorite. Because they are stony, these soils have poor tilth and are hard to work with machinery.

Ramsey soils make up about 2 percent of this association. They are on steep slopes that are highly dissected by intermittent drainageways. A few small areas are on mountain ridgetops. These soils are stony and have a pale-brown fine sandy loam surface layer, but the underlying material has had little profile development. They formed in the weathered products of sandstone and quartzite.

Most of this association is not suitable for cultivation and is mainly in forest. About 200 acres has been cleared and is in native bluegrass pasture. There are no farms entirely within this association, but some of the farmland extends into it. Deer, grouse, gray squirrel, bear, and other wildlife live in the area. Brook trout are in small mountain streams.

Soil association 13

Shallow and moderately deep, rapidly drained, rocky soils on steep mountain slopes underlain mainly by greenstone: Very rocky land, Rock land, basic, and Myersville soils

This soil association occupies about 8.7 percent of the county, or 14,870 acres. Most of it is on steep, east-facing slopes of mountains and is strongly dissected by intermittent and permanent streams. Many of the permanent streams in the county have their source in the springs in this area. This soil association is in the western part of the county, in a belt ½ to 2½ miles wide that extends from Panorama northeastward to the northern tip of the county. Parts of the Skyline Drive and the Appallachian Trail are in the association.

Very rocky land makes up about 45 percent of this association. Most of this land type is on steep slopes, but a few small areas are on milder slopes. Loose stones and rock outcrops, 10 feet apart or less, cover 50 to 90 percent of the surface area. All of Very rocky land is in the Blue Ridge Mountains; the rock is mostly greenstone. Small spots of Catoctin and Myersville soils are included.

Rock land, basic, makes up about 35 percent of this association. Most of it is in sloping and moderately steep areas between Compton Gap and Chester Gap, but small areas are scattered throughout the association. This land type consists of outcrops of greenstone bedrock and loose fragments of stone, roughly 10 to 30 feet apart, that cover 25 to 50 percent of the surface area. In places the soil material between the rock outcrops is silt loam, a few inches to several feet deep. Small spots of Catoctin and Myersville soils are included with Rock land, basic.

The Myersville soils, all of which are stony, make up 20 percent of the association. They are mostly on gently sloping to moderately steep, broad mountain ridges. These soils have a dark-brown to reddish-brown silt loam surface layer and a reddish-brown to dark-red silty clay loam to clay subsoil. They are medium acid to very strongly acid and are high in content of organic matter and in natural fertility. They are well drained and moderately deep and formed in material weathered from greenstone. Because of the stones, these soils have poor tilth and are hard to work.

This association is mostly in forest; about 85 percent of the acreage is in the Shenandoah National Park. An estimated 400 acres has been cleared and is used for apple orchards and native bluegrass pasture. None of the acreage is suitable for cultivation. Only small parts of some of the large farms are in this association, but near Chester Gap are small farms about 25 acres in size. These are operated by part-time farmers. Deer, grouse, bear, gray squirrel, and other wildlife are plentiful, and their food supply is abundant. There are trout in the small streams.

Use and Management of Soils

This section consists of three main parts. In the first part, some general practices of soil management are discussed. The second part describes the system of land capability classification used by the Soil Conservation Service and discusses use and management of each capability unit, or management group. The third part consists of a table that gives, for each soil at two levels of management, productivity ratings for specified crops.

General Principles of Soil Management

Most soils require general practices of management if they are to produce satisfactory yields. Before these practices can be carried out, several needs of the soils must be determined. Local representatives of the Soil Conservation Service will help you determine these needs.

Estimating the need for lime, phosphate, and potash.—Each soil can supply certain nutrients to plants naturally. A knowledge of this property of the soil helps in estimating crop needs for additional nutrients. Also important is a knowledge of how a field has been managed and of the yield level that the farmer wishes to maintain. Chemical tests and growing experiments on test plots are also helpful. Because of the differences in the soils, some parts of a field need more limestone or fertilizer than other parts. The soil map and the soil tests reveal these differences and help the farmer determine the kinds and amounts of amendments needed.

The yield level that the farmer wants to maintain has much to do with the amount of plant nutrients applied. Available capital and the current market must also be considered. If crops are removed from a field year after year and the soil is leached of lime and nutrients, the field cannot continue to produce satisfactory yields unless adequate amounts of lime and fertilizer are added.

Supplying organic matter and nitrogen.—Most of the soils in Rappahannock County are deficient in organic matter and nitrogen. If nitrogen is added to crops other than legumes, production is increased and more organic matter can be returned to the soil. Organic matter improves water-holding capacity and tilth and helps reduce erosion.

Nitrogen is supplied to the soil in a manner different from that of soil minerals such as phosphate and potash. Most of it is obtained from plant remains, especially those of legumes, and from animal manure or commercial fertilizer. Rain and air supply some nitrogen, which is combined by bacteria with other elements in the soil. The source of nitrogen depends largely on the kinds of crops grown.

At the time of seeding and as a topdressing, apply a complete fertilizer for small grains and a mineral fertilizer for legumes. A complete fertilizer is one containing phosphate, potash, and nitrogen; a mineral fertilizer is one containing phosphate and potash.

Selecting a good rotation.—A good rotation furnishes fresh organic matter to crops that need it most. If green-manure crops or residues from legumes are plowed under before corn is planted, the yield of corn will be increased. Good rotations help to control erosion, soil-borne diseases, and weeds. They distribute the drain of needed plant nutrients over a longer period of time and thereby lengthen the time for the normal weathering processes to replenish the nutrients.

In Rappahannock County, a good rotation includes alfalfa, red clover, ladino clover, lespedeza, or some other legume crop. Selection of the legume depends on the soil type and its level of productivity. A good rotation is corn, a small grain, and alfalfa for three years.

Controlling erosion.—Most of the land in Rappahannock County has been affected by sheet erosion. Some of the red soils are severely eroded and have shallow gullies. Improved use and management are needed to help control this erosion. In general, the steeper areas in the county should be kept in forest or pasture and protected from fires and overgrazing. In the sloping areas, provide sufficiently long rotations and plant crops that cover the soil most of the time. One of the best ways to minimize erosion is to manage the soil well and to raise fertility to a high level. An increased number of plants increases the organic matter and thus improves soil structure. Measures of erosion control that may be needed are contour stripcropping, contour tillage, terracing, and the sodding of drainageways. A stripcropped field is shown in figure 13.

Need for artificial drainage.—Each area needs study to determine if drainage is practical. If soil drainage is improved, most of the imperfectly drained to poorly drained soils in the county provide excellent grazing and yield some crops. Wet soils that cannot be tile drained are not so good for crops as soils that are permeable to water and roots. These soils are cold and are waterlogged in wet seasons; they bake and are hard in dry seasons. In wet areas, plant crops that are more tolerant of wetness and apply fertilizer to counteract leaching of the plant nutrients from the soil.

Tillage.—Soils must be in good tilth if they are to produce maximum yields. Tillage often breaks down the structure of a soil and causes loss of organic matter, but the deterioration is gradual and hardly noticeable. Many farmers do not detect this change in structure or tilth until the soils are very poor and are difficult to work.

Figure 13.—**Corn, a small grain, and hay grown in contour strips.**

Additions of organic matter and the growing of sod-forming crops aid materially in restoring the structure of the soil. Tillage implements are helpful in maintaining good tilth if they mix a great deal of organic matter into the surface layer. But overcultivation of the soils should be avoided. Some soils in the county puddle unless they are cultivated only within a narrow range of moisture content.

Capability Grouping

Capability grouping is a system of classification used to show the relative suitability of soils for crops, grazing, forestry, or wildlife. It is a practical grouping based on the needs and limitations of the soils, the risk of damage to them, and their response to management.

The capability unit, which can also be called a management group of soils, is the lowest level of capability grouping. A capability unit is made up of soils that are similar in kind of management needed, in risk of damage, and in general suitability for use.

The next broader grouping, the capability subclass, is used to indicate the dominant kind of limitation. The letter symbol "e" means that the main limiting factor is risk of erosion if a plant cover is not maintained. The symbol "w" means that excess water retards plant growth or interferes with cultivation. The symbol "s" means that the soils are shallow, stony, droughty, or low in fertility. The symbol "c" means that the climate is so hazardous that it limits the use of the soil. No soils in Rappahannock County are in subclass "c."

The broadest grouping, the class, is identified by Roman numerals. All of the soils in one class have limitations and management problems of about the same degree, but of different kinds, as shown by the subclass. All of the classes except class I may have one or more subclasses.

In classes I, II, and III are soils that are suitable for annual or periodic cultivation of annual or short-lived crops.

Class I soils are those that have the widest range of use and the least risk of damage. They are level or nearly level, productive, well drained, and easy to work. They can be cultivated with almost no risk of erosion and will remain productive if managed with normal care. There are no class I soils in Rappahannock County.

Class II soils can be cultivated regularly, but they do not have quite so wide a range of suitability as soils of class I. Some class II soils are gently sloping; consequently, they need moderate care to prevent erosion. Other soils in class II may be slightly droughty, slightly wet, or somewhat limited in depth.

Class III soils can be cropped regularly, but they have a narrower range of use than those in class II. They need even more careful management.

Class IV soils should be cultivated only occasionally or only under very careful management.

In classes V, VI, and VII are soils that normally should not be cultivated for annual or short-lived crops but that can be used for pasture. They can also be used as woodland, as parts of watersheds, or to provide shelter and food for wildlife.

Class V soils are nearly level to gently sloping, but they are wet, low in fertility, or otherwise unsuitable for cultivation.

Class VI soils, because they are steep, stony, droughty, or otherwise limited, are not suitable for the usual cropping systems. Their use is limited largely to pasture or range, woodland, or wildlife food and cover. Some soils in class VI can be cultivated enough so that, without damage, forest trees can be set out and pasture crops seeded. With enough precautions, some crops can be grown.

Class VII soils have severe limitations that make them unsuited to cultivation and that restrict their use largely to grazing, woodland, or wildlife.

In class VIII are soils that have practically no agricultural use. Some areas have value as watersheds, as habitats for wildlife, or as areas for recreation.

The following list shows the capability classes, subclasses, and units of soils in Rappahannock County.

Class II.—Soils having some limitations that reduce the choice of plants or require moderate conservation practices.
- Subclass IIe: Gently sloping soils that have moderate risk of erosion if not protected.
  - Unit IIe-1: Gently sloping, well-drained, deep, medium-textured, colluvial and alluvial soils.
  - Unit IIe-2: Gently sloping, medium-textured soils on uplands, including soils on old alluvium or colluvium.
  - Unit IIe-3: Gently sloping, medium-textured soils on old colluvium on the uplands.
- Subclass IIw: Moderately wet soils.
  - Unit IIw-1: Nearly level to gently sloping, medium-textured soils on young alluvium and recent colluvium.
  - Unit IIw-2: Nearly level to gently sloping, medium-textured soil on stream terraces.

Class III.—Soils having severe limitations that reduce the choice of plants or require special conservation practices, or both.
- Subclass IIIe: Sloping to gently sloping soils that have a high risk of erosion if tilled.
  - Unit IIIe-1: Sloping, well-drained, deep, medium-textured, colluvial and alluvial soils.

Unit IIIe-2: Sloping, predominantly medium textured soils on the uplands and old colluvium.
Unit IIIe-3: Sloping, moderately coarse textured soil on the uplands.
Unit IIIe-4: Gently sloping, well-drained, deep, moderately fine textured, eroded soils.
Subclass IIIw: Wet soils that require artificial drainage if they are tilled.
Unit IIIw-1: Nearly level, medium-textured soils on first bottoms; subject to overflow.
Unit IIIw-2: Nearly level to gently sloping, medium-textured soils that have a restricted root zone.
Subclass IIIs: Soils limited by moisture capacity, stoniness, or low fertility.
Unit IIIs-1: Stony, gently sloping, well-drained soil on old colluvium in the Blue Ridge Mountains.
Unit IIIs-2: Nearly level, excessively drained, recent alluvial soil.

Class IV.—Soils having very severe limitations that restrict the choice of plants, or require very careful management, or both.
Subclass IVe: Gently sloping to moderately steep soils; subject to severe erosion.
Unit IVe-1: Sloping, severely eroded, well-drained, moderately fine textured soils on the uplands.
Unit IVe-2: Sloping, friable soils on the uplands; shallow to bedrock.
Unit IVe-3: Moderately steep, medium-textured soils on the uplands.
Subclass IVw: Wet soils that require artificial drainage and that should not be tilled frequently.
Unit IVw-1: Wet, nearly level soil on first bottoms.
Subclass IVs: Soils severely limited by stoniness or shallowness.
Unit IVs-1: Stony and cobbly, sloping soils that have a permeable sandy clay loam to silty clay loam subsoil.
Unit IVs-2: Friable, stony, sloping soils; shallow to bedrock.

Class V.—Soils having little or no erosion hazard that, because of standing water or frequency of overflow, are not suitable for cultivation but are suitable for pasture or woodland.
Subclass Vw: Poorly drained soils that have a high water table.
Unit Vw-1: Wet, nearly level, medium-textured soils on first bottoms and low terraces.

Class VI.—Soils having severe limitations that make them generally unsuited for cultivation and that limit their use to pasture, woodland, or food and cover for wildlife.
Subclass VIe: Sloping to moderately steep soils subject to severe erosion.
Unit VIe-1: Moderately steep, severely eroded soils that have a moderately permeable clay subsoil.
Unit VIe-2: Moderately steep, very friable soils on the uplands; shallow to bedrock.
Subclass VIs: Nearly level to moderately steep soils that are very shallow or stony.
Unit VIs-1: Stony, moderately steep soils that have a permeable, coarse- to medium-textured subsoil.
Unit VIs-2: Stony and rocky, shallow soils that have a permeable subsurface layer.
Unit VIs-3: Nearly level, moderately deep, stony alluvial land.

Class VII.—Soils having very severe limitations that make them unsuited for cultivation and that restrict their use largely to grazing or woodland or to supporting wildlife.
Subclass VIIe: Soils too steep or too shallow to permit normal use for pasture.
Unit VIIe-1: Steep, very friable soils on the uplands; shallow to bedrock.
Subclass VIIs: Soils that are too steep, too stony, or too shallow for cultivation.
Unit VIIs-1: Steep, stony, moderately deep soils on the mountains.
Unit VIIs-2: Stony, steep, rocky soils; shallow to bedrock.
Unit VIIs-3: Stony, wet colluvial soil.

Class VIII.—Soils not suited to the growing of commercial vegetation but that furnish food for wildlife.
Subclass VIIIs: Extremely bouldery or ledgy areas that have limited use for forest but provide some food and shelter for wildlife.
Unit VIIIs-1: Stony and rocky land and made land.

Capability units

The soils of Rappahannock County have been placed in 30 capability units. The soils in one unit have about the same limitations, need essentially the same management, and respond to management in approximately the same way. Additional information about the management of each soil is furnished in the section, Descriptions of Soils.

CAPABILITY UNIT IIe–1

Gently sloping, well-drained, deep, medium-textured, colluvial and alluvial soils: For the most part, the soils in this group have a firm clay subsoil that is permeable to roots of the crops commonly grown. Depth to bedrock ranges from 6 to 12 feet. The soils are well drained, surface runoff is not too difficult to control, and the capacity for holding moisture available for plants is high. Fertility and the content of organic matter are high; the soils are medium acid to strongly acid. They are easy to work only within a narrow range of moisture content. They respond to good management and are suited to many crops. Their firm clay subsoil makes them less well suited to root crops and vegetables than the more sandy soils. The following soils are in capability unit IIe-1.

Dyke loam, gently sloping phase.
Hiwassee loam, gently sloping phase.

Crops well suited to the soils in this group are corn, alfalfa, small grains, lespedeza, red clover, white clover, ladino clover, soybeans, orchardgrass, Kentucky 31 fescue, legume grass pasture, and tree fruits. Most of the crops ordinarily grown need a pH of 6 to 6.5; alfalfa needs a pH of 6.5 to 7.2. Phosphate and potash are needed for

high yields of all crops and pasture plants. Nitrogen is also necessary, except for well-established legumes.

If the soils in this group are plowed or cultivated when they are too wet, they clod and good tilth is difficult to maintain. Plow the soils early in spring and at the right moisture content. To avoid unnecessary runoff and to minimize erosion, plow on the contour. Fertilize and lime the pastures and protect them from overgrazing.

CAPABILITY UNIT IIe-2

Gently sloping, medium-textured soils on uplands, including soils on old alluvium or colluvium: Most of the soils in this group have a clay loam to silty clay loam subsoil that is moderately permeable. The depth to bedrock ranges from 4 to 25 feet. These soils are well drained, have good moisture content, and have a good capacity for holding moisture available for plants. If the soils are well managed, the volume of runoff is not great. Fertility and the organic-matter content are low to moderately high; the soils are medium acid to very strongly acid. They respond well to good management and are suited to many crops. The following soils are in capability unit IIe-2:

Chester loam, gently sloping phase.
Chester-Brandywine loams, eroded gently sloping phases.
Culpeper loam, gently sloping phase.
Eubanks and Lloyd loams, gently sloping phases.
Eubanks-Chester complex, gently sloping phases.
Unison loam, gently sloping phase.
Wickham loam, gently sloping phase.

Well suited to the soils in this group are vegetables, truck crops, corn, alfalfa, small grains, lespedeza, red clover, white clover, ladino clover, soybeans, orchardgrass, Kentucky 31 fescue, legume-grass pasture, and fruit trees. A field of corn is shown in figure 14. The soils are well suited to pasture, and yields of good-quality forage are high if a moderate amount of lime and phosphate is applied. Good management of pasture includes rotation of grazing and the clipping of weeds and other undesirable vegetation.

Good tilth is easy to maintain. Although these soils can be plowed early in spring, it is possible to plow and prepare seedbeds just before planting the crops. To control runoff of water, plow and cultivate on the contour and sod the waterways on the steep slopes.

***Figure 14.*—Corn on well-fertilized Wickham loam, gently sloping phase. This field has an average yield of 110 bushels per acre.**

CAPABILITY UNIT IIe-3

Gently sloping, medium-textured soils on old colluvium on the uplands: For the most part, the soils in this group have a clay loam subsoil that is moderately permeable. The depth to bedrock ranges from 3 to 5 feet. These well-drained soils have fair moisture content and have a medium capacity for holding moisture available for plants. The amount of surface runoff is not excessive if good management is practiced. Fertility and the organic-matter content are low to medium low; the soils are strongly acid to medium acid. They respond well to good management. The following soils are in capability unit IIe-3:

Albemarle fine sandy loam, gently sloping phase.
Unison loam, gently sloping fragipan variant.

Small grains and lespedeza are best suited to the soils in this group. Corn, clover, grasses, and legume-grass pasture are fairly well suited. The soils are highly leached and are deficient in nitrogen, phosphorus, and possibly potassium. All the crops respond well to heavy applications of a complete fertilizer; pasture needs frequent applications. Add nitrogen by turning under a leguminous green-manure crop. Except for the use of contour tillage on the more sloping areas, no control of runoff water is needed. If grazing is controlled, these soils will maintain weed-free pasture of good quality.

CAPABILITY UNIT IIw-1

Nearly level to gently sloping, medium-textured soils on young alluvium and recent colluvium: These soils are friable and permeable. The depth to bedrock ranges from 6 to 15 feet. These well drained to moderately well drained soils have good moisture content and a good capacity for supplying moisture to plants. Surface runoff from the adjacent higher lying areas is somewhat hazardous in the areas on recent colluvium. Overflows make the bottom lands somewhat unsuited to certain crops, especially alfalfa. Fertility and the organic-matter content are high; the soils are medium acid to strongly acid. Tilth is good and, except in wet seasons, the soils are easy to work. High productivity is not difficult to maintain, and the soils are suited to many crops. The following soils are in capability unit IIw-1:

Congaree fine sandy loam.
Meadowville loam.

Crops well suited to the soils in this capability unit are corn, red clover, ladino clover, white clover, lespedeza, orchardgrass, fescue, timothy, soybeans, vegetables, and legume-grass pasture. Alfalfa is not suited. It produces well for 2 or 3 years, and then, when the root reach the water table, the stand dies out. If phosphate is applied and if grazing is regulated, the soils are good for pasture. Moderate applications of a complete fertilizer produce good yields on these soils. Protection from overflow is the main conservation need.

CAPABILITY UNIT IIw-2

Nearly level to gently sloping, medium-textured soil on stream terraces: The only soil in this unit, Altavista loam, has a friable clay loam to silty clay loam subsoil that is moderately permeable. The depth to bedrock

ranges from 3 to 10 feet. Surface runoff is slow to medium, and the water-holding capacity is high. The moisture content is good for most crops, but the soil ponds in flat areas. Natural fertility and the content of organic matter are medium; the soil is strongly acid. The plow layer has fair tilth, but, during wet periods, the soil is not accessible to heavy farm machinery. It responds to good management and is easy to conserve.

Crops well suited to Altavista loam are corn, soybeans, orchardgrass, ladino clover and other clovers, fescue, small grains, lespedeza, and some truck crops. Because it has excessive internal moisture, the soil is not suited to alfalfa. The stand normally dies out after 1 or 2 years.

Corn, small grains, and pastures need a complete fertilizer and lime. The clipping of weeds and other undesirable vegetation and moderately close grazing help maintain pastures of high quality. In the steep areas, contour tillage controls runoff; in the flat areas, the soil ponds and artificial drainage is necessary.

CAPABILITY UNIT IIIe-1

Sloping, well-drained, deep, medium-textured, colluvial and alluvial soils: The soils in this group have a firm clay subsoil that is permeable to the roots of crops commonly grown. The depth to bedrock ranges from 4 to 10 feet. These well-drained soils have good moisture content and a moderate capacity for holding moisture available for plants. It is necessary to control runoff of surface water. Fertility and the content of organic matter are high; the soils are medium acid to very strongly acid. Except in the eroded areas, the plow layer has good tilth. Steep slopes, stoniness, and erosion, however, interfere with field operations. The soils respond well to good management, and they have a moderately wide range of suitability for crops. Row crops should not be grown more than 1 year out of every 3 or 4. The following soils are in capability unit IIIe-1:

Dyke loam, eroded sloping phase.
Hiwassee loam, sloping phase.

Crops well suited to the soils in this group are corn, small grains, soybeans, alfalfa, lespedeza, red clover, white clover, ladino clover, orchardgrass, fescue, legume-grass pasture, and tree fruits. The soils respond to a complete fertilizer, but mostly they need phosphate and potash. To improve tilth, apply lime and increase the organic-matter content of the plow layer. In the more eroded areas, use straw or other mulches. To prevent puddling, plow early in spring and at the right moisture content. Plow on the contour and use stripcropping. To dispose of excess surface water, it is good practice to sod the waterways. Keep close-growing vegetation on the acreage as much of the time as possible, and do not allow livestock to trample the soils when they are wet or to graze pasture too closely.

CAPABILITY UNIT IIIe-2

Sloping, predominantly medium textured soils on the uplands and old colluvium: For the most part, the soils in this group have a moderately fine textured subsoil that is moderately permeable. The depth to bedrock ranges from 4 to 20 feet. These well-drained soils have fairly good moisture content and have a moderate capacity for holding moisture available for plants. It is necessary to control runoff of surface water. Fertility and the organic-matter content are medium; the soils are medium acid to very strongly acid. They respond well to good management and are suited to many crops, but row crops should not be grown more than 1 year out of every 3 or 4. The following soils are in capability unit IIIe-2:

Chester loam, eroded sloping phase.
Chester-Brandywine loams, eroded sloping phases.
Culpeper loam, eroded sloping phase.
Eubanks and Lloyd loams, eroded sloping phases.
Eubanks-Brandywine complex, sloping phases.
Eubanks-Chester complex, sloping phases.
Unison loam, eroded sloping phase.

Crops well suited to the soils in this group are corn, alfalfa, small grains, soybeans, lespedeza, red clover, white clover, ladino clover, orchardgrass, fescue, pasture mixtures, tree fruits, vegetables, and truck crops. All of the soils in capability unit IIIe-2 are well suited to pasture. If pasture is fertilized adequately and grazed properly, the control of weeds is not difficult but infrequent mowing is necessary. Although a complete fertilizer is useful, the soils need mainly applications of phosphate and potash. Because the soils are eroded, special care is necessary to increase and maintain their content of organic matter. To minimize runoff of surface water, plow and cultivate on the contour and use stripcropping and sodded waterways. Heavy seeding, so as to obtain a dense stand, improves the intake rate and water-holding capacity of the soils.

CAPABILITY UNIT IIIe-3

Sloping, moderately coarse textured soil on the uplands: The single soil in this unit, Albemarle fine sandy loam, sloping phase, has a sandy clay loam to clay loam subsoil that is moderately permeable. The depth to bedrock ranges from 3 to 5 feet. This well-drained soil has a medium capacity for holding water available for plants. It is necessary to control runoff of surface water. Fertility and the organic-matter content are medium low to low; the soil is very strongly acid to strongly acid. It responds to good management.

Crops fairly well suited to Albemarle fine sandy loam, sloping phase, are corn, small grains, clover, timothy, lespedeza, and legumes and grasses for pasture. Red clover and alfalfa are suited if good management is practiced and if fertility is increased and maintained. The soil needs applications of a complete fertilizer for crops other than legumes. Cultivate on the contour, use stripcropping, and sod the waterways.

CAPABILITY UNIT IIIe-4

Gently sloping, well-drained, deep, moderately fine textured, eroded soils: For the most part, the soils in this group have a clay subsoil that is permeable to roots of the crops commonly grown. The depth to bedrock ranges from 4 to 10 feet. The moisture content of these soils is good for most crops, but since the surface soil has been lost through erosion, the intake of water is limited and surface runoff is a problem. Fertility is moderately high, and the organic-matter content is medium to low. Soils in this group have lost nearly all of their surface layer, and the plow layer is now in the subsoil. The plow layer has medium to poor tilth, and the soils have a narrow range of moisture content within which they can be

worked. The soils respond well to good management. In capability unit IIIe-4 are the following:

Eubanks and Lloyd clay loams, severely eroded gently sloping phases.
Hiwassee clay loam, severely eroded gently sloping phase.

If they are well managed, these soils are well suited to alfalfa, corn, small grains, lespedeza, red clover, orchardgrass, fescue, legume-grass mixtures for pasture, and fruit trees. These eroded soils need more lime than the noneroded phases of Eubanks and Lloyd soils and of Hiwassee soils. To improve and maintain tilth, apply manure, if it is available, or other organic matter and liberal amounts of a complete fertilizer. Work these soils only when their moisture content is good. If cultivated when they are too wet, they form clods. Early deep plowing is a common practice to improve tilth. In winter, the soils heave badly and damage small grains and fall-seeded pastures. To minimize runoff of surface water, till on the contour and use stripcropping. The use of long crop rotations is best because these help protect the soil from further erosion.

CAPABILITY UNIT IIIw-1

Nearly level, medium-textured soils on first bottoms; subject to overflow: These soils are friable and permeable. Bedrock or other geologic material that restricts roots is at depths of 5 to 12 feet. Soils in this group are moderately well drained to poorly drained; they have a large capacity for holding moisture available for plants. Tillage is moderately easy when the soils have good moisture content. The runoff of surface water is not serious, but overflows from higher lying areas cause excess moisture, which interferes with tillage and makes some care necessary to maintain good tilth. Fertility and the organic-matter content are fairly high; the soils are medium acid to strongly acid. Good management and tile drainage improve these soils, but their suitability for crops is limited. In capability unit IIIw-1 are the following:

Alluvial land.
Chewacla silt loam.

Crops best suited to these soils are corn, soybeans, white clover, ladino clover, fescue, lespedeza, timothy, and legume-grass mixtures for pasture. Because of overflows from streams, small grains, alfalfa, and many vegetable crops are poorly suited. The favorable moisture content of these soils makes them suitable for permanent pasture, and, if they are well fertilized, pasture is excellent. Phosphate is the fertilizer most needed; close grazing keeps down undesirable weeds and grasses. The management needed most is protection from overflows. The soils respond well to tile or open drainage and, if drained, give increased yields of a wider range of crops than are now grown. Figure 15 shows a field on Chewacla silt loam on which tile drains are to be installed.

CAPABILITY UNIT IIIw-2

Nearly level to gently sloping, medium-textured soils that have a restricted root zone: A hardpan or predominant wetness in these soils limits the root zone to a depth of about 20 inches. The upper part of the soils is permeable, and the plow layer has good tilth. The moisture content is fair to good, and these soils have a moderate capacity for holding moisture available for plants. If the acreage is well managed, runoff of surface water is not difficult to control. Excess moisture in these soils is a more common problem than in soils that have deep, permeable root zones. Fertility and the organic-matter content are medium to low; the soils are strongly acid to medium acid. They respond well to good management, but the range of suitability for plants is somewhat limited. The following soils are in capability unit IIIw-2:

Figure 15.—Tile stacked along line where it will be laid.

Augusta silt loam.
Belvoir loam.

Crops fairly well suited to these soils are corn, small grains, clover, lespedeza, grass, and soybeans. Ladino clover is better suited than red clover, and Kentucky 31 fescue is better suited than orchardgrass. Alfalfa is grown in some areas, but the stands normally die out because the soils are wet. The soils are better suited to

pasture than to row crops. Good pasture management includes application of fertilizer and lime, the clipping of herbage, and the regulation of grazing. A complete fertilizer is good for these soils, but mostly they need applications of phosphate and potash. The wetness of these soils restricts tillage and, in many places, makes artificial drainage necessary. Seed heavily to insure good stands and to help improve tilth.

CAPABILITY UNIT IIIs-1

Stony, gently sloping, well-drained soil on old colluvium in the Blue Ridge Mountains: The only soil in this unit, Unison cobbly loam, gently sloping phase, has a medium-textured subsoil and is very permeable. The soil is well drained and has a good capacity for holding water available for plants. Fertility and the organic-matter content are moderately high; the soil is medium acid. This is a fairly good soil that responds well to good management, but stoniness limits its use.

All field crops and many truck crops are suited to this soil, but the acreages are generally too stony for cultivation. Lespedeza, red clover, timothy, orchardgrass, and Kentucky 31 fescue, grown alone or mixed, are suited to the soil in this unit. Fruit trees and pasture also do well. The soil is well suited to apple orchards. Take care in selecting sites for the orchards to insure correct exposure and proper air drainage. Orchards respond to applications of nitrogen. If the soil in this capability unit is put into cultivation, it is best to remove the stones and cobbles and plow on the contour. For cultivated crops, use a long rotation that includes corn or some other row crop only once in every 5 to 7 years.

CAPABILITY UNIT IIIs-2

Nearly level, excessively drained, recent alluvial soil: The single soil in this group, Buncombe loamy fine sand, is coarse textured and very permeable. The depth to bedrock ranges from 6 to 20 feet. The soil is excessively drained and has a poor capacity for holding water available for plants. Fertility and the organic-matter content are low; the soil is strongly acid. The plow layer has good tilth and is easy to work within a wide range of moisture content. Because of its droughtiness, the soil has a limited range of suitability for crops.

Fairly well suited to Buncombe loamy fine sand are melons and some truck crops. The soil is not suited to alfalfa and small grains. It is deficient in lime, nitrogen, phosphorus, potassium, and organic matter. To maintain high yields under intensive use, heavy applications of lime and a complete fertilizer are needed. Workability of the soil is very good, and special tillage or cropping practices to maintain tilth and to control water are not generally necessary. The soil can be cultivated within a wide range of moisture content without serious injury. Although this soil is not ordinarily susceptible to erosion, in places good management is necessary to protect streambanks from scouring.

CAPABILITY UNIT IVe-1

Sloping, severely eroded, well-drained, moderately fine textured soils on the uplands: The soils in this group have a clay subsoil that is moderately permeable. The depth to bedrock ranges from 4 to 18 feet. These soils are well drained and have a fairly good capacity for holding water available for plants. Most of the surface soil has been removed through accelerated erosion, which has caused loss of organic matter and plant nutrients and has increased difficulty in maintaining good tilth. The range of moisture content within which the soils can be tilled is narrow; the intake rate of water is low, and runoff is rapid. These soils heave in winter, which limits their use and suitability for crops. The following soils are in capability unit IVe-1:

Culpeper clay loam, severely eroded sloping phase.
Eubanks and Lloyd clay loams, severely eroded sloping phases.
Hiwassee clay loam, severely eroded sloping phase.

Crops best suited to these soils are hay, small grains, and pasture (fig. 16). The soils are only fairly well suited to row crops and alfalfa. Good management includes use of a long rotation consisting of small grains and sod-forming crops. These severely eroded soils need liberal quantities of lime and a fertilizer high in nitrogen. If plowing and cultivation are necessary, plow on the contour and use stripcropping to minimize runoff of water. If the soils are in grass, feed cattle on them in winter to increase organic matter through manure and waste hay. To maintain a permanent cover, use straw and other mulches. To help maintain good pasture, graze moderately close and clip weeds and other unwanted vegetation.

CAPABILITY UNIT IVe-2

Sloping, friable soils on the uplands; shallow to bedrock: These soils are friable to very friable, permeable loam, gritty loam, and silt loam. They are somewhat excessively drained to excessively drained, and runoff is rapid. Their fertility and organic-matter content are medium to low; the soils are medium acid to strongly acid. The plow layer has good tilth. In some places, where bedrock is close to the surface, partly weathered rock fragments are exposed. Very careful management is necessary if these soils are used for cultivated crops. In capability unit IVe 2 are the following:

Brandywine gritty loam, gently sloping phase.
Brandywine gritty loam, sloping phase.
Brandywine loam, sloping phase.
Brandywine silt loam, eroded sloping phase.
Hazel loam, sloping phase.
Louisburg sandy loam, sloping phase.

Soils in this group are best suited to pasture and forest. If very careful management is practiced, small grains, soybeans, orchard crops, and some truck crops are suited. Alfalfa is not suited. These soils are deficient in organic matter. If they are cultivated, they need heavy applications of manure, if it is available, or legumes turned under as green manure. Liberal amounts of a complete fertilizer are also necessary. The farmer can till these soils within a wide range of moisture content and can prepare the seedbeds immediately before he plants them. Stripcropping and sodding of waterways help minimize runoff on cultivated acreages.

CAPABILITY UNIT IVe-3

Moderately steep, medium-textured soils on the uplands: The only mapping unit in this group, Eubanks-Brandywine complex, eroded moderately steep phases, has a clay loam to sandy loam subsoil that is permeable. The depth to bedrock ranges from 2 to 8 feet. The soils are well drained to somewhat excessively drained and

Figure 16.—**Pasture on Hiwassee soils in foreground; apple and peach orchards in background.**

have a moderate capacity for holding moisture available for plants. Surface runoff is severe and is a serious hazard. Fertility and the organic-matter content are medium to low; the soils are medium acid to very strongly acid. They respond well to good management, but they are susceptible to erosion and excessive runoff because they are on steep slopes.

Pasture and orchards are best suited to Eubanks-Brandywine complex, eroded moderately steep phases. If the acreage is very carefully managed, it can be used for cultivated crops, but long crop rotations, those lasting 4 to 7 years, are necessary. Good management includes stripcropping and the grassing of waterways. Although some areas are planted to alfalfa, the soils are not suited to it and yields are low.

Careful soil management and control of grazing provide for good pasture on these soils. Orchards do well in the sloping areas, but take care to choose sites that have good air drainage. The soils respond to nitrogen. Orchards especially need this element. For good production of all crops, apply liberal amounts of lime and complete fertilizer.

CAPABILITY UNIT IVw–1

Wet, nearly level soil on first bottoms: The only soil in this unit, Wehadkee silt loam, is susceptible to flooding and seepage from higher areas. Internal drainage is very slow, and excess water is a problem. Organic-matter content is low, but natural fertility is moderately high. This soil is medium acid in reaction. Tilth of the plow layer is fair, but wetness restricts the use of heavy tillage machinery.

Crops that require frequent tillage are not well suited. If adequate drainage outlets can be provided or if protection from overflow is provided, improved pasture and corn can be grown with moderate success.

CAPABILITY UNIT IVs–1

Stony and cobbly, sloping soils that have a permeable sandy clay loam to silty clay loam subsoil: The soils of this capability unit have a thick, friable to very friable root zone. They are well drained and have a moderate capacity for holding water available for plants. Runoff is severe. The content of organic matter and plant nutrients is medium to low; the soils are medium acid to very strongly acid. They respond well to good management, but stones and cobbles restrict cultivation. The following soils are in capability unit IVs-1:

Halewood stony fine sandy loam, sloping phase.
Myersville stony silt loam, sloping high phase.
Porters stony loam, sloping phase.
Porters stony loam, gently sloping phase.
Stony local alluvial land, sloping phase.
Stony local alluvial land, gently sloping phase.
Unison cobbly loam, sloping phase.

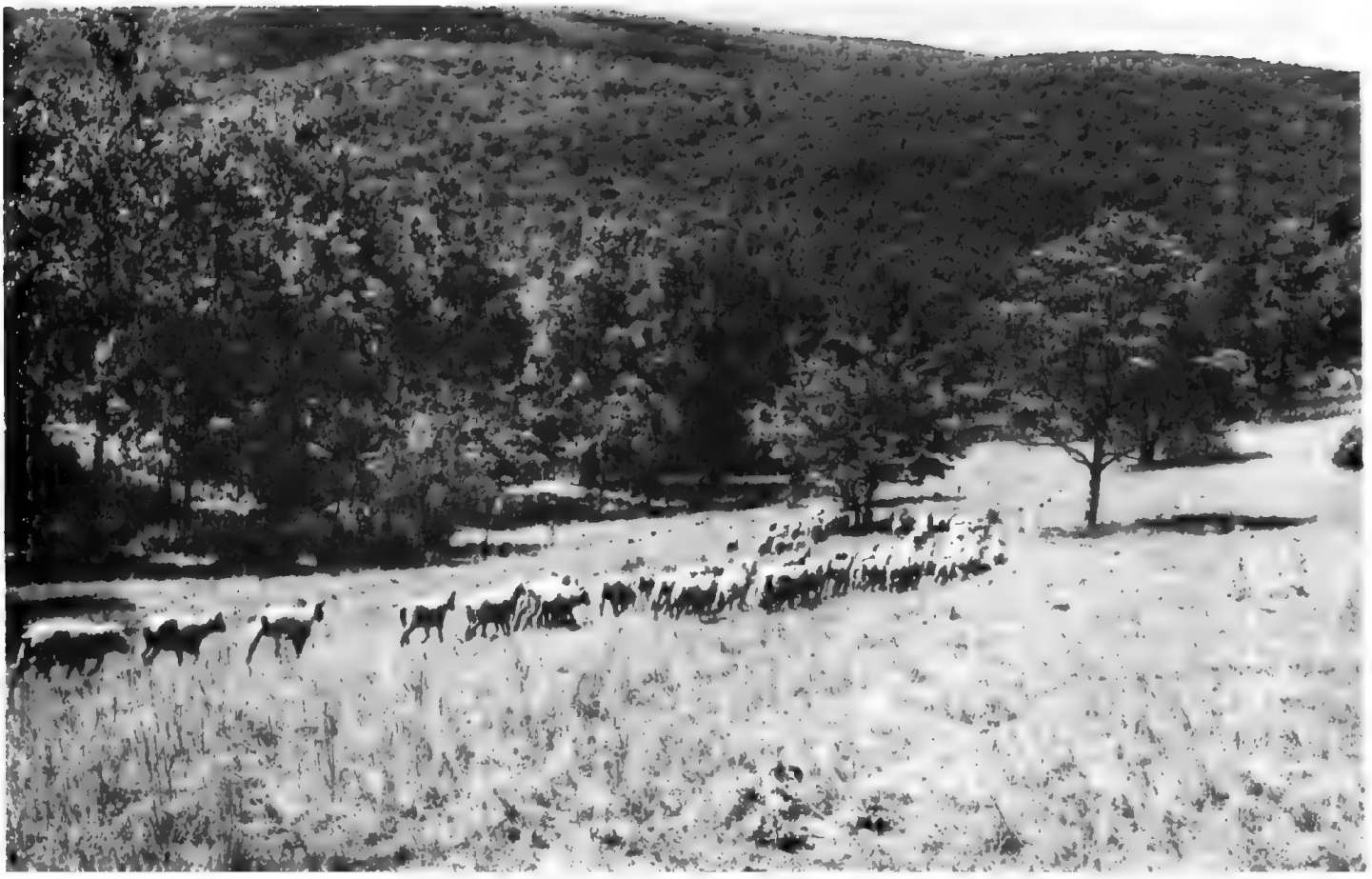

Figure 17.—Pasture on Halewood stony fine sandy loam, sloping phase.

Best suited to the soils in this group are permanent pasture, orchards, and forest (fig. 17). Good pasture yields may be obtained under careful management that includes moderate applications of lime and complete fertilizer. As these soils are at an altitude high enough to get good air drainage, they are excellent for apple orchards. Because of possible frost damage, however, the choice of a site with proper exposure for orchards is important.

CAPABILITY UNIT IVs-2

Friable, stony, sloping soils; shallow to bedrock: The soils in this unit are somewhat excessively drained. They have a low capacity for holding water available for plants. Fertility and the organic-matter content are medium to medium low; the soils are medium acid to very strongly acid. They respond to good management, but their range of suitability for plants is limited. Stones and a few rock outcrops restrict cultivation. The following soils are in this capability unit:

Brandywine stony loam, sloping phase.
Louisburg stony sandy loam, sloping phase.

The soils are best suited to permanent pasture and orchards. Moderate applications of lime and complete fertilizer produce good yields of pasture. Orchards do well on these soils, but because they are shallow, there is some danger of the trees blowing over. If these soils are planted to row crops, manage them very carefully and use long rotations.

CAPABILITY UNIT Vw-1

Wet, nearly level, medium-textured soils on first bottoms and low terraces: The soils in this unit are in places susceptible to flooding and seepage from higher areas. Their internal drainage is poor to very poor, and excess water is a critical problem. The content of organic matter and plant nutrients ranges from low to moderately high. The soils are strongly acid to medium acid. They are hard to work but easy to conserve. The soils in capability unit Vw-1 are:

Roanoke silt loam.
Worsham silt loam.

These soils are best suited to pasture. The seeding of ladino clover, Korean lespedeza, redtop, Kentucky 31 fescue, and other water-tolerant plants improves the quality of forage and increases the carrying capacity of pasture on the soils in this group. The water table fluctuates; in winter and early in spring, it is at or near the surface, but in summer and fall it is considerably lower. These soils furnish a good amount of pasture throughout spring and fall, and they are particularly valuable in the dry summer months when pasture growth is poor on the droughty, well-drained upland soils.

Mostly these soils need applications of lime, phosphate, and potash.

CAPABILITY UNIT VIe-1

Moderately steep, severely eroded soils that have a moderately permeable clay subsoil: These soils are moderately permeable throughout. The depth to bedrock ranges from 2 to 6 feet. The soils are well drained, but their capacity for holding moisture available to plants is limited. Runoff and erosion are severe. Fertility is moderately low, and the organic-matter content is low. The soils are medium acid to very strongly acid. They are hard to work, and when the acreage is cultivated, erosion is very difficult to control. The following soils are in capability unit VIe-1:

Culpeper clay loam, severely eroded moderately steep phase.
Eubanks and Lloyd clay loams, severely eroded moderately steep phases.

The soils in this group are not suited to cultivation. They are best suited to pasture and woods. Apple orchards do well if the right site is selected. To produce good yields, these soils need liberal applications of lime and a fertilizer high in nitrogen. Controlled grazing and the frequent clipping of weeds are important in maintaining pasture of high quality. Feeding animals on the acreage increases the organic-matter content, water-absorbing ability, and water-holding capacity of the soils.

CAPABILITY UNIT VIe-2

Moderately steep, very friable soils on the uplands; shallow to bedrock: The soils in this group have a very friable, permeable subsoil of loam, silt loam, or sandy loam. They are somewhat excessively drained to excessively drained and have a low capacity for holding moisture available for plants. Surface runoff is high. Fertility and the content of organic matter are medium to low; the soils are medium acid to very strongly acid. Their plow layer has good tilth, but their shallow depth to bedrock and steepness of slope make use of farm machinery difficult. These soils respond little to good management; therefore, their suitability for use is limited. The following soils are in capability unit VIe-2:

Brandywine gritty loam, moderately steep phase.
Brandywine loam, moderately steep phase.
Brandywine silt loam, eroded moderately steep phase.
Hazel loam, moderately steep phase.
Louisburg sandy loam, moderately steep phase.

The soils in this group are suited to apple orchards, lespedeza, forest, and most perennial legumes and grasses for pasture. They are not suited to cultivation. Liberal amounts of lime and complete fertilizer are necessary to provide satisfactory yields. Pasture can be clipped to control undesirable plants; avoid close grazing and overtrampling.

CAPABILITY UNIT VIs-1

Stony, moderately steep soils that have a permeable, coarse- to medium-textured subsoil: The depth to bedrock in these soils ranges from 18 inches to 6 feet, and the parent rocks are mostly greenstone and granodiorite. The internal drainage is good, and the capacity for holding moisture available for plants is moderate. The organic-matter content and fertility are medium to high; the soils are medium acid to very strongly acid. Their stony profile and predominantly strong slopes greatly limit their suitability for use. The following soils are in capability unit VIs-1:

Eubanks and Lloyd stony loams, eroded moderately steep phases.
Halewood stony fine sandy loam, moderately steep phase.
Myersville stony silt loam, moderately steep high phase.
Porters stony loam, moderately steep phase.
Stony local alluvial land, moderately steep phase.

These soils are best used for apples, woods, and native pasture. Because they are stony, steep, and not accessible to farm machinery, they are not suited to cultivated crops. They are suited to apple orchards if sites are selected that have good air drainage to lessen frost damage. For good yields, these soils need liberal applications of a fertilizer high in phosphate and potash. Apples, especially, respond to nitrogen.

CAPABILITY UNIT VIs-2

Stony and rocky, shallow soils that have a permeable subsurface layer: The soils and miscellaneous land types in this unit are well drained to excessively drained; they have a low capacity for holding moisture available for plants. Fertility and the content of organic matter are medium to low; the reaction ranges from medium acid to extremely acid. Capability unit VIs-2 is composed of the following:

Brandywine stony loam, moderately steep phase.
Brandywine rocky loam, sloping phase.
Brandywine rocky loam, moderately steep phase.
Hazel stony loam, moderately steep phase.
Louisburg stony sandy loam, moderately steep phase.
Rock land, acidic, moderately steep phase.
Rock land, basic, moderately steep phase.

Because they are stony, rocky, and shallow, these soils and land types are not suited to cultivated crops. Also, they are sloping to moderately steep and are droughty and susceptible to erosion. Best suited to these soils are trees and native pasture. To obtain suitable pasture yields, apply lime and complete fertilizer liberally. Forest management is the same as for soils in capability unit VIIe-1.

CAPABILITY UNIT VIs-3

Nearly level, moderately deep, stony alluvial land: The only mapping unit in this group, Stony alluvial land, is not suited to cultivation, because it contains many stones and cobbles. The areas vary in moisture content and are frequently overflowed. Fertility and the organic-matter content range from low to medium; the reaction is medium acid to strongly acid.

Stony alluvial land is best suited to hay or pasture. For satisfactory yields, apply liberal applications of lime and complete fertilizer. Protect the land from flooding and seepage from higher lying areas.

CAPABILITY UNIT VIIe-1

Steep, very friable soils on the uplands; shallow to bedrock: These soils are excessively drained; they have low capacity for holding moisture available for plants. Surface runoff is severe. Fertility and the organic-matter content are low; the soils are medium acid to very strongly acid. The following soils are in capability unit VIIe-1:

Brandywine loam, steep phase.
Hazel loam, steep phase.

Because they are steep, shallow, and droughty, the soils in this unit are not suited to cultivated crops. They have very rapid runoff and are susceptible to erosion. They are best suited to forest but are moderately well suited to permanent pasture. Good forest management on these soils includes the following practices:

(1) Controlling fire, trampling, and damage from other causes.
(2) Systematic cutting of desirable trees and the culling of inferior trees.
(3) Harvesting of mature trees in such a manner that desirable young trees succeed them.
(4) Maintaining a full stand of desirable trees.

CAPABILITY UNIT VIIs-1

Steep, stony, moderately deep soils on the mountains: The soils in this group have a permeable subsoil. The depth to granodiorite bedrock ranges from 18 inches to 3 feet. These soils are somewhat excessively drained. Their capacity for holding moisture available for plants is moderately low, and runoff is severe. The organic-matter content and fertility range from high to medium low; the soils are medium acid to strongly acid. Capability unit VIIs-1 contains the following soils:

Halewood stony fine sandy loam, steep phase.
Porters stony loam, steep phase.

Because they are steep and stony, the soils in this group are not suited to cultivated crops. They have rapid runoff and are susceptible to erosion. Although the steep slopes make management very difficult, these soils produce good native pasture and are good for apple orchards. Moderate applications of lime and complete fertilizer provide satisfactory yields of pasture. Forest management for this group of soils is the same as that for soils in capability unit VIIe-1.

CAPABILITY UNIT VIIs-2

Stony, steep, rocky soils; shallow to bedrock: These soils and miscellaneous land types are permeable, but they have a low capacity for holding moisture available for plants, and surface runoff is severe. Fertility and the organic-matter content are medium to low; the reaction ranges from strongly acid to extremely acid. In capability unit VIIs-2 are the following:

Brandywine rocky loam, steep phase.
Brandywine stony loam, steep phase.
Catoctin stony silt loam, steep phase.
Hazel stony loam, steep phase.
Louisburg soils, steep phases.
Ramsey stony fine sandy loam, steep phase.
Rock land, acidic, steep phase.
Rock land, basic, steep phase.

Because they are steep, shallow, stony or rocky, and droughty, the soils and land types in this group are not suited to cultivation. In addition, they have rapid runoff and are susceptible to erosion. They are poorly accessible to farm machinery. These soils and land types are only fairly well suited to native pasture; they are best used as woodland. They should not be cleared but should remain in hardwood forest. Forest management is the same for this capability unit as for unit VIIe-1. Catoctin stony silt loam, steep phase, and Rock land, basic, steep phase, support a different forest cover from the other soils and land types in this unit.

CAPABILITY UNIT VIIs-3

Stony, wet colluvial soil: The only soil in this capability unit, Worsham stony silt loam, is very stony, and the problem of excess water is serious. Runoff and the intake rate are slow, and water stands on the surface for a long time after rains. The soil is low in organic-matter content and in fertility. It is strongly acid in reaction.

Because it is wet and stony, Worsham stony silt loam is not suited to cultivated crops. It is poorly suited to pasture and should remain in forest.

CAPABILITY UNIT VIIIs-1

Stony and rocky land and made land: This capability unit consists of the following miscellaneous land types:

Made land.
Riverwash.
Rock outcrop.
Stony colluvial land.
Very rocky land.

These land types have little or no agricultural value. They support a sparse vegetation that should not be removed. They are used as habitats for wildlife, as watersheds, or for recreation.

Productivity Ratings

In table 5 are given productivity ratings for each soil in Rappahannock County at two levels of management—common management and improved management. The ratings are listed in terms of percentage of the standard yield, which is given at the top of the column for the stated crop. The standard yield is the approximate average yield obtained, without the use of fertilizer or other amendments, on the more extensive and productive soils of the region in the United States where the crop is most commonly grown. For example, the standard yield for corn is 50 bushels an acre. A productivity rating of 60 for corn means that the soil can be expected to produce about 60 percent of 50, or 30 bushels per acre, as an average yield for a number of years.

In columns A the productivity rating for each soil is the percentage of the standard yield that can be expected at the level of management generally practiced in the county at the time of the survey. These ratings are based largely on (a) observations made by the soil survey party; (b) information from farmers and other agricultural workers in the area; and (c) comparisons with productivity ratings for other counties in Virginia that have soils similar to those in Rappahannock County.

In columns B the productivity rating for each soil is the percentage of standard yield that can be obtained under improved management, or the best management that the farmers can be expected to follow. Improved management requires:

1. Proper choice and rotation of crops.
2. Correct use of commercial fertilizer, lime, and manure.
3. Proper tillage.
4. Return of organic matter to the soil.
5. Adequate mechanical means for controlling water.
6. Maintaining or improving productivity and workability.
7. Conserving soil material, plant nutrients, and soil moisture.

TABLE 5.—*Productivity ratings for each soil in the county, at two levels of management,*

[Yields in columns A are those obtained under management common

Soil	Grain								Hay	
	Corn (100=50 bu. per acre)		Wheat (100=25 bu. per acre)		Oats (100=50 bu. per acre)		Barley (100=40 bu. per acre)		Orchardgrass and lespedeza (100=2 tons per acre)	
	A	B	A	B	A	B	A	B	A	B
Albemarle fine sandy loam:										
Gently sloping phase	60	84	48	72	32	56	40	65	75	100
Sloping phase	50	70	40	64	28	48	30	55	50	75
Alluvial land [3]	50	80	(4)	(4)	(4)	(4)	(4)	(4)	50	87
Altavista loam	70	100	60	80	60	80	50	87	75	125
Augusta silt loam	30	50	24	56	24	50	25	50	50	100
Belvoir loam	56	80	32	60	36	60	32	62	50	100
Brandywine gritty loam:										
Gently sloping phase	40	70	40	72	36	52	30	55	62	100
Sloping phase	(2)	(4)	(2)	(4)	(2)	(4)	(2)	(4)	50	87
Moderately steep phase	(2)	(4)	(2)	(4)	(2)	(4)	(2)	(4)	(2)	(4)
Brandywine loam:										
Sloping phase	70	96	72	104	60	80	55	85	87	150
Moderately steep phase	(2)	(4)	(2)	(4)	(2)	(4)	(2)	(4)	(2)	(4)
Steep phase	(3)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Brandywine rocky loam:										
Sloping phase	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(2)	(4)
Moderately steep phase	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Steep phase	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Brandywine silt loam:										
Eroded sloping phase	70	100	72	112	60	90	60	100	100	187
Eroded moderately steep phase	(2)	(4)	(2)	(4)	(2)	(4)	(2)	(4)	(2)	(4)
Brandywine stony loam:										
Sloping phase	(2)	(4)	(2)	(4)	(2)	(4)	(2)	(4)	(2)	(4)
Moderately steep phase	(2)	(4)	(2)	(4)	(2)	(4)	(2)	(4)	(2)	(4)
Steep phase	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Buncombe loamy fine sand [4]	30	60	(2)	(4)	(2)	(4)	(2)	(4)	20	50
Catoctin stony silt loam, steep phase	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Chester loam:										
Gently sloping phase	130	200	100	140	80	130	100	140	125	200
Eroded sloping phase	116	180	88	120	72	112	90	120	125	187
Chester-Brandywine loams:										
Eroded gently sloping phases	110	140	84	120	76	90	88	120	100	175
Eroded sloping phases	100	124	80	112	76	90	75	110	100	175
Chewacla silt loam [4]	80	110	(2)	(4)	(2)	(4)	(2)	(4)	87	137
Congaree fine sandy loam [4]	116	140	(2)	(4)	(2)	(4)	(2)	(4)	125	200
Culpeper clay loam:										
Severely eroded sloping phase	52	60	40	64	44	52	45	70	25	100
Severely eroded moderately steep phase	(2)	(4)	(2)	(4)	(2)	(4)	(2)	(4)	(2)	(4)
Culpeper loam:										
Gently sloping phase	80	140	64	112	68	80	60	85	75	162
Eroded sloping phase	60	90	48	72	52	64	50	75	62	150
Dyke loam:										
Gently sloping phase	120	170	92	124	60	90	90	137	125	175
Eroded sloping phase	100	148	80	116	50	84	75	120	100	175
Eubanks-Brandywine complex:										
Sloping phases	80	116	60	100	56	100	87	105	100	162
Eroded moderately steep phases	(2)	(4)	(2)	(4)	(2)	(4)	(2)	(4)	50	87
Eubanks-Chester complex:										
Gently sloping phases	110	180	80	120	80	114	90	137	125	200
Sloping phases	96	144	72	112	72	100	75	125	125	187
Eubanks and Lloyd clay loams:										
Severely eroded gently sloping phases	64	130	48	80	48	70	50	82	87	150
Severely eroded sloping phases	56	116	40	72	36	52	42	80	75	137
Severely eroded moderately steep phases	(2)	(4)	(2)	(4)	(2)	(4)	(2)	(4)	50	87
Eubanks and Lloyd loams:										
Gently sloping phases	120	180	80	120	70	126	95	130	112	175
Eroded sloping phases	90	148	76	100	60	104	90	110	100	175
Eubanks and Lloyd stony loams, eroded moderately steep phases	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Halewood stony fine sandy loam:										
Sloping phase	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(2)	(4)
Moderately steep phase	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Steep phase	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)

See footnotes at end of table.

in terms of percentage of standard yield for named crops and pasture plants

in the county; those in columns B, under improved management]

Hay—Continued						Pasture				Fruit			
Orchardgrass and red clover (100=2½ tons per acre)		Alfalfa and orchardgrass (100=4 tons per acre)		Timothy and red clover (100=2 tons per acre)		Bluegrass, orchardgrass, and white clover (100=100 cow-acre-days) [1]		Orchardgrass, lespedeza, and ladino clover (100=100 cow-acre-days) [1]		Apples (100—200 bu. per acre)		Peaches (100=200 bu. per acre)	
A	B	A	B	A	B	A	B	A	B	A	B	A	B
60	80	50	75	50	112	30	100	140	200	(2)	(2)	(2)	(2)
40	60	50	75	50	87	30	100	130	190	(2)	(2)	(2)	(2)
40	80	(4)	(4)	50	75	65	130	140	190	(4)	(4)	(4)	(4)
60	110	66	75	50	100	105	150	170	170	(4)	(4)	(4)	(4)
40	80	(2)	(4)	37	62	75	118	90	120	(4)	(4)	(4)	(4)
40	80	(2)	(4)	37	62	75	115	90	120	(4)	(4)	(4)	(4)
40	70	(2)	(4)	25	50	35	70	(2)	(4)	(2)	(4)	(2)	(4)
30	60	(2)	(4)	25	37	35	70	(2)	(4)	(2)	(4)	(2)	(4)
(2)	(4)	(4)	(4)	(2)	(4)	25	50	(2)	(4)	(2)	(4)	(2)	(4)
80	120	(2)	(4)	75	112	85	120	(2)	(4)	70	90	50	60
(2)	(4)	(2)	(4)	(2)	(4)	75	110	(2)	(4)	70	90	(2)	(4)
(2)	(4)	(4)	(4)	(4)	(4)	65	100	(2)	(4)	60	70	(2)	(4)
(2)	(4)	(4)	(4)	(2)	(4)	70	110	(2)	(4)	(2)	(4)	(2)	(4)
(4)	(4)	(4)	(4)	(4)	(4)	60	110	(2)	(4)	(2)	(4)	(2)	(4)
(4)	(4)	(4)	(4)	(4)	(4)	45	80	(2)	(4)	(2)	(4)	(2)	(4)
80	150	(2)	(4)	87	125	90	125	(2)	(4)	75	95	(2)	(4)
(2)	(4)	(2)	(4)	(2)	(4)	75	120	(2)	(4)	75	95	(2)	(4)
(2)	(4)	(4)	(4)	(2)	(4)	75	110	(2)	(4)	70	90	(2)	(4)
(2)	(4)	(4)	(4)	(2)	(4)	65	100	(2)	(4)	70	90	(2)	(4)
(4)	(4)	(4)	(4)	(4)	(4)	35	70	(4)	(4)	50	60	(4)	(4)
(2)	(4)	(4)	(4)	25	50	25	45	(2)	(4)	(4)	(4)	(4)	(4)
(4)	(4)	(4)	(4)	(4)	(4)	35	70	(2)	(4)	(2)	(4)	(2)	(4)
100	160	100	112	100	150	95	190	180	220	80	100	80	105
100	150	87	100	87	137	95	180	170	210	77	97	75	100
80	140	62	81	75	137	95	180	160	210	77	97	70	97
80	140	62	75	62	125	75	140	150	205	77	97	70	95
100	150	(4)	(4)	75	100	95	160	180	220	(4)	(4)	(4)	(4)
70	160	(2)	(4)	100	150	165	190	180	220	(4)	(4)	(4)	(4)
40	80	62	69	25	87	25	70	(2)	(4)	(2)	(4)	(2)	(4)
(2)	(4)	(2)	(4)	(2)	(4)	20	60	(2)	(4)	(2)	(4)	(2)	(4)
100	130	87	100	75	137	35	140	180	210	(2)	(4)	(2)	(4)
40	120	69	87	62	125	35	140	170	195	(2)	(4)	(2)	(4)
100	150	100	112	100	150	95	190	180	210	60	90	75	110
90	140	94	106	100	150	85	180	170	200	55	85	67	90
70	130	69	81	75	112	80	150	165	200	75	95	67	90
60	120	50	62	50	87	75	140	(2)	(4)	70	90	60	72
100	160	100	112	100	150	95	190	185	220	77	97	77	102
100	140	87	100	87	137	95	180	175	210	75	95	72	97
80	120	81	94	87	125	65	130	105	125	45	55	37	50
70	100	75	87	75	122	55	110	80	100	37	47	30	40
40	80	50	75	62	100	45	100	70	90	(2)	(4)	(2)	(4)
90	150	87	112	100	150	95	190	185	210	77	97	77	102
80	140	82	106	87	137	95	190	180	205	75	95	77	97
(4)	(4)	(4)	(4)	(4)	(4)	65	120	(2)	(4)	80	100	70	92
(2)	(4)	(2)	(4)	(2)	(4)	60	110	(2)	(4)	95	115	80	105
(4)	(4)	(4)	(4)	(4)	(4)	60	110	(4)	(4)	90	110	70	100
(4)	(4)	(4)	(4)	(4)	(4)	50	100	(4)	(4)	75	95	(4)	(4)

TABLE 5.—*Productivity ratings for each soil in the county, at two levels of management,*

[Yields in columns A are those obtained under management common

Soil	Grain								Hay	
	Corn (100=50 bu. per acre)		Wheat (100=25 bu. per acre)		Oats (100=50 bu. per acre)		Barley (100=40 bu. per acre)		Orchardgrass and lespedeza (100=2 tons per acre)	
	A	B	A	B	A	B	A	B	A	B
Hazel loam:										
Sloping phase	40	60	48	68	44	64	45	62	37	75
Moderately steep phase	(2)	(4)	(2)	(4)	(2)	(4)	(2)	(4)	(2)	(4)
Steep phase	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Hazel stony loam:										
Moderately steep phase	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Steep phase	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Hiwassee clay loam:										
Severely eroded gently sloping phase	70	148	60	96	48	70	62	100	87	150
Severely eroded sloping phase	60	120	48	80	36	56	47	80	75	112
Hiwassee loam:										
Gently sloping phase	120	170	92	124	60	90	90	137	125	175
Sloping phase	100	150	80	116	50	90	75	130	100	175
Louisburg sandy loam:										
Sloping phase	(2)	(4)	(2)	(4)	(2)	(4)	(2)	(4)	25	50
Moderately steep phase	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Louisburg soils, steep phases	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Louisburg stony sandy loam:										
Sloping phase	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Moderately steep phase	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Made land	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Meadowville loam [5]	160	200	80	108	60	76	60	75	125	200
Myersville stony silt loam:										
Sloping high phase	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(2)	(4)
Moderately steep high phase	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Porters stony loam:										
Gently sloping phase	(2)	(4)	(2)	(4)	(2)	(4)	(2)	(4)	62	112
Sloping phase	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(2)	(4)
Moderately steep phase	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(2)	(4)
Steep phase	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Ramsey stony fine sandy loam, steep phase.	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Riverwash [4]	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Roanoke silt loam	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Rock land, acidic:										
Moderately steep phase	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Steep phase	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Rock land, basic:										
Moderately steep phase	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Steep phase	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Rock outcrop	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Stony alluvial land [4]	(2)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	50	75
Stony colluvial land	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Stony local alluvial land:										
Gently sloping phase	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	87	137
Sloping phase	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	75	125
Moderately steep phase	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(2)	(4)
Unison cobbly loam:										
Gently sloping phase	(2)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	87	137
Sloping phase	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	75	125
Unison loam:										
Gently sloping phase	114	200	80	128	76	120	95	125	125	200
Eroded sloping phase	110	180	72	112	70	100	75	105	125	187
Gently sloping fragipan variant	70	94	60	80	40	70	45	75	87	137
Very rocky land	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Wehadkee silt loam [4]	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Wickham loam, gently sloping phase	140	220	80	140	90	130	100	150	125	200
Worsham silt loam	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Worsham stony silt loam	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)

[1] Cow-acre-days is the number of days a year that 1 animal unit can be supported on 1 acre without injury to the pasture. An animal unit is 1 mature cow, steer, or horse; 5 hogs; or 7 sheep or goats. For example, if 1 cow can be grazed for 100 days during the year without injury to the soil, this soil would have a carrying capacity of 100 cow-acre-days.

in terms of percentage of standard yield for named crops and pasture plants—Continued

in the county; those in columns B, under improved management]

Hay—Continued						Pasture				Fruit			
Orchardgrass and red clover (100=2½ tons per acre)		Alfalfa and orchardgrass (100=4 tons per acre)		Timothy and red clover (100=2 tons per acre)		Bluegrass, orchardgrass, and white clover (100=100 cow-acre-days) [1]		Orchardgrass, lespedeza, and ladino clover (100=100 cow-acre-days) [1]		Apples (100=200 bu. per acre)		Peaches (100—200 bu. per acre)	
A	B	A	B	A	B	A	B	A	B	A	B	A	B
40	60	[4]	[4]	37	50	55	100	[2]	[4]	[2]	[4]	[4]	[4]
[2]	[4]	[4]	[4]	[2]	[4]	50	95	[2]	[4]	[2]	[4]	[4]	[4]
[4]	[4]	[4]	[4]	[4]	[4]	45	85	[4]	[4]	[4]	[4]	[4]	[4]
[4]	[4]	[4]	[4]	[4]	[4]	40	80	[4]	[4]	[4]	[4]	[4]	[4]
[4]	[4]	[4]	[4]	[4]	[4]	35	70	[4]	[4]	[4]	[4]	[4]	[4]
80	120	87	100	87	125	65	130	105	125	45	55	37	50
70	100	75	87	75	100	55	110	80	100	37	47	30	40
100	150	100	112	100	150	95	190	185	210	60	90	75	110
90	140	94	112	100	150	85	180	175	200	55	85	67	90
[2]	[4]	[4]	[4]	[2]	[4]	35	85	[2]	[4]	[2]	[4]	[4]	[4]
[4]	[4]	[4]	[4]	[4]	[4]	30	75	[4]	[4]	[2]	[4]	[4]	[4]
[4]	[4]	[4]	[4]	[4]	[4]	25	55	[4]	[4]	[2]	[4]	[4]	[4]
[4]	[4]	[4]	[4]	[4]	[4]	30	70	[4]	[4]	[2]	[4]	[4]	[4]
[4]	[4]	[4]	[4]	[4]	[4]	25	60	[4]	[4]	[2]	[4]	[4]	[4]
[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]
100	160	[2]	[4]	100	150	165	190	185	220	[2]	[4]	[2]	[4]
[2]	[4]	[4]	[4]	[2]	[4]	65	110	[2]	[4]	95	115	80	105
[4]	[4]	[4]	[4]	[4]	[4]	55	110	[2]	[4]	90	110	70	100
50	90	[2]	[4]	50	75	65	110	[2]	[4]	100	120	90	110
[2]	[4]	[2]	[4]	[2]	[4]	55	110	[2]	[4]	95	115	80	105
[2]	[4]	[4]	[4]	[2]	[4]	55	110	[2]	[4]	90	110	70	100
[4]	[4]	[4]	[4]	[4]	[4]	50	100	[2]	[4]	75	95	[4]	[4]
[4]	[4]	[4]	[4]	[4]	[4]	35	75	[4]	[4]	[2]	[4]	[4]	[4]
[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]
[4]	[4]	[4]	[4]	[4]	[4]	[2]	[4]	30	190	[4]	[4]	[4]	[4]
[4]	[4]	[4]	[4]	[4]	[4]	45	90	[4]	[4]	[2]	[4]	[4]	[4]
[4]	[4]	[4]	[4]	[4]	[4]	35	70	[4]	[4]	[2]	[4]	[4]	[4]
[4]	[4]	[4]	[4]	[4]	[4]	55	110	[4]	[4]	[2]	[4]	[4]	[4]
[4]	[4]	[4]	[4]	[4]	[4]	45	90	[4]	[4]	[2]	[4]	[4]	[4]
[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]
40	80	[4]	[4]	50	62	58	110	108	120	[4]	[4]	[4]	[4]
[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]
70	110	[2]	[4]	62	100	65	120	[2]	[4]	95	165	85	110
60	100	[2]	[4]	50	87	65	120	[2]	[4]	95	115	80	105
[2]	[4]	[4]	[4]	[2]	[4]	55	110	[2]	[4]	80	100	70	100
70	110	[2]	[4]	62	100	65	120	115	130	80	100	80	105
60	100	[2]	[4]	50	87	65	110	105	120	77	97	75	100
100	160	100	112	100	150	95	190	185	220	80	100	80	105
100	150	87	100	87	137	95	180	175	210	77	97	75	100
70	110	50	62	62	100	65	120	165	200	[2]	[4]	[2]	[4]
[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]
[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	40	190	[4]	[4]	[4]	[4]
100	160	87	112	100	150	95	190	185	220	90	110	80	105
[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	40	190	[4]	[4]	[4]	[4]
[4]	[4]	[4]	[4]	[4]	[4]	25	50	[4]	[4]	[4]	[4]	[4]	[4]

[2] Crop not commonly grown.
[3] Subject to overflow.
[4] Crop not commonly grown, and the soil is considered physically unsuited to it under the management specified.
[5] Small grains lodge on this soil.

The productivity ratings in columns B are based largely on estimates made by men who have had experience with the soils and crops in the county. In making these estimates, it was judged how much crop yields might increase if known deficiencies in the soils were corrected within practical limits. By comparing the figures in columns B with those in columns A, one may gain some idea of the response a soil will make if it receives improved management. On practically all soils of the county, more intensive management increases yields.

Engineering Properties of Soils

The soil survey report contains information about the soils of Rappahannock County that will be helpful to engineers in the selection of sites for buildings and other structures; in the choosing of locations for highways and airports; in the installation of septic tanks; in the locating of areas for sanitary fills; in the determination of the trafficability of soils; in the locating of sand and gravel for use in construction; and in the design of dams, ponds, and other structures to help control floods and conserve soil and water.

The soil maps and accompanying report are too generalized for some engineering purposes, but they provide information valuable in the planning of detailed field surveys and in planning tests to determine the in-place condition of soils at proposed sites for construction. After testing the soil materials and observing their behavior in place and under varying conditions, the engineer can anticipate, with fairly reasonable accuracy, the properties of individual soils wherever they are mapped.

This section is based on two tables. In table 6 are the results of actual tests on samples of each of seven extensive soil series. These tests were made according to standard procedures and were used in evaluating all the soils of the county for engineering uses. Mechanical analyses were made, and liquid limits and plastic limits were determined. Mechanical analyses were made by the combined sieve and hydrometer methods.

Table 7 provides estimates on texture, permeability, shrink-swell potential, and other properties of soils sig-

TABLE 6.—*Engineering test data* [1] *for*

Soil name and location	Parent material	Virginia report number	Depth	Horizon	Moisture-density		Mechanical analyses [2]			
					Maximum dry density	Optimum moisture	Discarded in field sampling (estimated larger than 3 inches)	Percentage passing sieve [3]—		
								2-in.	1½-in.	1-in.
			Inches		*Lb. per cu. ft.*	*Percent*	*Percent*			
Brandywine loam:										
4 miles east of U.S. Highway No. 522, on Route 637.	Granite and granodiorite.	S035835	3–10	A_1	109	14	----------	------	100	93
		S035836	20–38	C_2	116	12	----------	------	------	------
Chester loam:										
0.75 mile northwest of Flint Hill.	Granite and granodiorite.	S035832	0–8	A_{2p}	106	17	----------	------	------	100
		S035833	11–22	B_2	105	19	----------	------	------	------
		S035834	44–120	C_2	109	16	----------	------	------	------
Dyke loam:										
0.75 mile west of U.S. Highway No. 522 on Route 630.	Old colluvium from greenstone.	S035837	0–8	A_p	103	18	----------	------	------	------
		S035838	18–29	B_{21}	101	22	----------	------	------	------
		S035839	93–144+	C_2	90	30	----------	------	------	------
Eubanks and Lloyd loams:										
1 mile east of Flint Hill on Route 647.	Granite and granodiorite.	S035829	0–5	A_p	110	16	----------	------	------	------
		S035830	17–26	B_{22}	102	22	----------	------	------	------
		S035831	79–96	C_2	104	19	----------	------	------	------
Hiwassee loam:										
0.33 mile east of State Highway No. 231 on Route 707.	Alluvial terraces from basic rocks.	S035840	0–5	A_p	101	20	----------	------	------	------
		S035841	15–67	B_{22}	91	29	----------	------	------	------
Myersville stony silt loam:										
1.25 miles north of Compton Gap, along a trail.	Greenstone	S035842	0–5	A_{1p}	81	34	18	82	61	57
		S035843	11–26	B_2	93	27	18	------	------	------
		S035844	26–46	C_1	91	27	18	------	------	------
Wickham loam:										
0.75 mile north of Route 618 on State Highway No. 231.	Alluvial terraces from acidic rocks.	S035845	0–10	A_p	109	16	----------	------	------	------
		S035846	10–38	B_2	102	20	----------	------	------	------
		S035847	52–70	C_1	105	19	----------	------	------	------

[1] Tests performed by the Virginia Department of Highways in accordance with standard procedures of the American Association of State Highway Officials (AASHO).

[2] Mechanical analyses according to AASHO Designation T. 88. Results by this procedure frequently differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes for soils.

nificant in engineering, as well as ratings showing the relative suitability of the soils for ponds, irrigation, septic tanks, and other uses.

Both tables contain engineering classifications and terms that may not be familiar to some readers who are interested in building ponds, irrigation systems, or other structures. These terms are explained in the following paragraphs. Terms used in soil science that may not be familiar are defined in the Glossary at the back of this report.

Engineering Classifications

AASHO classification system.—In this system soil materials are classified in seven principal groups (table 6). The groups range from A-1, consisting of gravelly soils of high bearing capacity, to A-7, consisting of clay soils having low strength when wet. Within each group, the relative engineering value of the soil material can be indicated by a group index number. Group indexes range from 0 for the best materials to 20 for the poorest. The group index number is shown in parentheses following the soil-group symbol in table 6.

Unified classification system.—Some engineers prefer to use the Unified soil classification system (table 6). In this system, soil materials are identified as coarse grained (eight classes), fine grained (six classes), or highly organic (one class).

Engineering Terms

Liquid limit, plastic limit, and plasticity index (table 6) measure the effect of water on the consistence of the soil material. As the moisture content of a clay soil increases from a very dry state, the material changes from a solid to a semisolid or plastic state. As the moisture content is further increased, the material changes from the plastic to a liquid state. The plastic limit is the moisture content at which the soil material passes from a semisolid to a plastic state. The liquid limit is the moisture content at which the material changes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is in a plastic condition.

samples taken from seven soil profiles

Mechanical analyses [2]—Continued										Liquid limit	Plasticity index	Classification	
Percentage passing sieve [3]—Continued						Percentage smaller than [3]—							
¾-in.	⅜-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.			AASHO [4]	Unified [5]
88	82	77	74	61	41	33	24	12	6	29	[6] NP	A-4(1)	SM.
------	------	-------	100	57	27	22	15	8	6	26	[6] NP	A-2-4(0)	SM.
97	96	95	95	75	55	39	25	11	6	34	6	A-4(4)	ML.
------	------	-------	100	83	71	65	58	39	29	45	14	A-7-5(10)	ML.
------	------	-------	100	74	55	49	29	11	6	34	[6] NP	A-4(4)	ML.
------	------	-------	100	89	72	66	53	33	22	42	16	A-7-6(10)	ML-CL.
------	------	-------	100	93	79	78	72	65	59	55	26	A-7-6(17)	MH-CH.
------	------	-------	100	98	88	79	75	60	50	74	34	A-7-5(20)	MH.
------	------	-------	100	92	73	68	55	32	20	31	7	A-4(8)	ML-CL.
------	------	-------	100	95	80	79	73	58	50	52	18	A-7-5(14)	MH.
------	------	-------	100	86	63	59	46	26	20	37	[6] NP	A-4(6)	ML.
------	------	-------	100	85	66	45	27	12	7	37	4	A-4(6)	ML.
------	------	-------	100	97	90	88	83	76	72	57	13	A-7-5(13)	MH.
56	49	45	43	35	30	23	17	9	6	51	6	A-5(1)	GM.
------	- -	--- -	[7] 82	75	67	54	49	27	16	46	11	A-7-5(10)	ML.
------	------	-------	[7] 82	79	75	64	51	30	16	47	6	A-5(9)	ML.
------	------	------ -	100	91	72	71	57	33	19	34	12	A-6(9)	ML-CL.
------	------	-------	100	91	76	75	69	53	45	48	18	A-7-5(13)	ML.
------	------	-------	100	86	65	61	53	47	35	44	12	A-7-5(7)	ML.

[3] Based on total material. Laboratory test data corrected for amount discarded in field sampling.

[4] Based on the Classification of Soils and Soil-Aggregate Mixtures for Highway Purposes. AASHO Designation: M 145-49.

[5] Based on the Unified Soil Classification System, Tech. Memo. No. 3-357, v. 1, Waterways Experiment Station, Corps of Engineers, March 1953.

[6] NP=Nonplastic.

[7] Laboratory samples contained soft fragments between 3 inches and ¼ inch in size. These coarse fragments were pulverized in sample preparation.

TABLE 7.—*Engineering*

Soil type and map symbols	Depth	Dominant texture	Permeability	Shrink-swell potential	Hydrologic rating [1]	Depth to and kind of bedrock
	Inches					
Albemarle fine sandy loam (AbB, AbC).	0–11	Fine sandy loam	Rapid	Low	B	3 to 7 feet; arkosic sandstone, quartzite, and phyllite.
	11–14	Sandy clay loam	Moderately rapid	Low	B	
	14–28	Clay loam	Moderate	Low	B	
	28–37	Light sandy clay loam.	Moderate	Low	B	
	37–45	Weathered rock	Moderately rapid	Low	B	
Alluvial land (Ad)	0–14	Variable	Varied	Low	A to D	10 feet plus; variable
	14–36	Variable	Varied	Low	A to D	
Altavista loam (At)	0–8	Loam	Rapid	Low	B	10 feet plus; variable
	8–13	Light clay loam	Moderately rapid	Low	B	
	13–18	Silty clay loam	Moderate	Low	B	
	18–30	Clay loam	Moderate	Low	B	
	30–36	Sandy clay loam	Moderately rapid	Low	B	
Augusta silt loam (Au)	0–11	Silt loam	Moderately rapid	Low	C	10 feet plus; variable
	11–15	Light clay loam	Moderate	Low	C	
	15–26	Silty clay	Slow	Low to moderate	C	
	26–39	Sandy clay loam	Moderate	Low	C	
	39–54	Weathered rock	Moderately rapid	Low	C	
Belvoir loam (Be)	0–9	Loam	Moderately rapid	Low	C	8 feet; granite and granodiorite.
	9–14	Sandy clay loam	Moderate	Low	C	
	14–33	Sandy clay	Slow	Low to moderate	C	
	33–48	Clay loam	Very slow	Low to moderate	C	
	48–50	Sandy soil material.	Moderately rapid	Low	C	
Brandywine loam (BoC, BoD, BoE).	0–18	Loam	Rapid	Very low	B	3 to 12 feet; granite and granodiorite.
	18–32	Weathered rock	Rapid	Very low	B	
Brandywine gritty loam (BgB, BgC, BgD).	0–12	Gritty loam	Rapid	Very low	B	4 to 12 feet; granite
	12–48	Gritty sandy loam	Rapid	Very low	B	
Brandywine rocky loam (BrC, BrD, BrE).	0–18	Loam	Rapid	Very low	B	0 to 5 feet; granite and granodiorite.
	18–48	Weathered rock	Rapid	Very low	B	
Brandywine silt loam (BwC2, BwD2).	0–16	Silt loam	Rapid	Very low	B	6 to 12 feet; crushed granite and granodiorite.
	16–26	Silt loam	Moderately rapid	Very low	B	
Brandywine stony loam (ByC, ByD, ByE).	0–12	Loam	Rapid	Very low	B	3 to 12 feet; granite and granodiorite.
	12–38	Weathered rock	Rapid	Very low	B	
Buncombe loamy fine sand (Bz).	0–15	Loamy fine sand	Very rapid	Very low	A	10 feet plus; variable
	15–24	Loamy fine sand	Very rapid	Very low	A	
	24–40	Coarse sand	Very rapid	Very low	A	
	40–52	Fine sandy loam	Rapid	Very low	A	
	52–54	Fine sandy loam	Rapid	Very low	A	
Catoctin stony silt loam (CaE).	0–18	Silt loam	Rapid	Low	C	2 to 8 feet; greenstone
	18–30	Weathered rock	Moderate	Low	C	
Chester loam (CdB, CdC2).	0–8	Loam	Rapid	Very low	B	6 to 15 feet; granite and granodiorite.
	8–11	Sandy clay loam	Moderately rapid	Low	B	
	11–22	Silty clay loam	Moderate	Low	B	
	22–29	Sandy clay loam	Moderately rapid	Low	B	
	29–44	Weathered rock	Moderately rapid	Low	B	
Chester-Brandywine loams (CeB2, CeC2).	0–8	Loam	Rapid	Very low	B	3 to 15 feet; granite and granodiorite.
	8–18	Loam and sandy clay loam.	Rapid to moderate	Very low to low	B	
	18–29	Silty clay loam and weathered rock.	Moderately rapid	Very low to low	B	
	29–44	Weathered rock	Moderately rapid	Low	B	
Chewacla silt loam (Ch).	0–16	Silt loam	Moderately rapid	Low	C	10 feet plus; variable
	16–28	Silt loam	Moderately slow	Moderately low	C	
	28–43	Silt loam	Slow	Moderately low	C	

See footnote at end of table.

characteristics of soils

Minimum depth to water table during wettest periods	Suitability for—					Remarks
	Topsoil	Farm ponds	Septic tanks	Irrigation	Earthwork during prolonged wet periods	
Feet						
10+	Good	Good	Good	Good	Good.	
0–3	Fair to poor	Fair to poor	Very poor	Poor	Poor to very poor.	Subject to frequent overflow; variable texture and drainage.
3½–10	Good	Good	Fair	Good	Poor to fair	Alluvial deposits on stream terraces.
1–2	Fair	Good to very poor.	Very poor	Fair	Poor to very poor.	Alluvial deposits on stream terraces.
2–5	Good	Good to very good.	Very poor	Fair	Poor to very poor.	Perched water table at 18 to 32 inches, on top of a fragipan.
10+	Very good	Fair	Good	Good	Good	In places hard rock may be a problem in installation of septic tanks.
10+	Fair	Very poor	Very good	Fair	Good to very good.	Very good for subgrade material.
10+	Good	Poor	Fair to good	Fair	Good	Bedrock outcrop on the surface.
10+	Good	Poor to fair	Good	Good	Fair	Fine mica flakes throughout soil profile.
10+	Good	Fair	Good	Fair	Good	Hard rock and loose stones may interfere with installation of septic tanks.
10+	Fair to poor	Very poor	Very good	Poor	Good to very good.	Subject to overflow; good source of medium sand and fine sand.
10+	Fair to good	Fair	Poor	Fair	Poor.	
10+	Good	Good	Very good	Very good	Good.	
10+	Good to very good.	Fair to good	Good to very good.	Good to very good.	Good	In places, hard rock may be a problem in installation of septic tanks.
1–1½	Very good	Good	Poor	Good to fair	Fair to poor	Subject to frequent overflow.

TABLE 7.—*Engineering*

Soil type and map symbols	Depth	Dominant texture	Permeability	Shrink-swell potential	Hydrologic rating [1]	Depth to and kind of bedrock
	Inches					
Congaree fine sandy loam (Co).	0–8	Fine sandy loam	Very rapid	Very low	A or B	10 feet plus; variable
	8–21	Fine sandy loam	Very rapid	Very low	A or B	
	21–28	Coarse sand	Very rapid	Very low	A or B	
	28–40	Silt loam	Rapid	Low	A or B	
	40–52	Silt loam	Rapid	Low	A or B	
Culpeper loam (CuB, CuC2).	0–7	Loam	Rapid	Low	B	4 to 12 feet; arkosic sandstone and quartzite.
	7–12	Sandy clay loam	Rapid	Low	B	
	12–33	Clay	Rapid	Low to moderate	B	
	33–41	Clay loam	Moderately rapid	Low to moderate	B	
	41–48	Weathered rock	Moderately rapid	Low	B	
Culpeper clay loam (CpC3, CpD3).	0–8	Clay loam	Moderately rapid	Low to medium	B	4 to 12 feet; arkosic sandstone, quartzite and phyllite.
	8–24	Clay	Rapid	Low to medium	B	
	24–30	Clay loam	Moderately rapid	Low to medium	B	
	30–40	Weathered rock	Moderately rapid	Low	B	
Dyke loam (DyB, DyC2)	0–8	Loam to silt loam	Rapid	Low	B	8 to 15 feet; granodiorite.
	8–18	Clay loam	Rapid	Low	B	
	18–29	Clay	Rapid	Moderate	B	
	29–40	Clay	Rapid	Moderate	B	
	40–72	Silty clay	Moderately rapid	Low	B	
Eubanks and Lloyd loams (EuB, EuC2).	0–5	Loam	Rapid	Low	B	5 to 14 feet; granite and granodiorite.
	5–9	Silty clay loam	Rapid	Low	B	
	9–17	Clay	Moderately rapid	Low to moderate	B	
	17–26	Clay	Moderately rapid	Low to moderate	B	
	26–34	Clay loam	Moderately rapid	Low to moderate	B	
	34–96	Weathered rock	Rapid	Low	B	
Eubanks and Lloyd clay loams (EuB3, EuC3, EuD3).	0–7	Clay loam	Moderately rapid	Low to moderate	B	5 to 14 feet; granite and granodiorite.
	7–21	Clay	Moderately rapid	Low to moderate	B	
	21–30	Clay loam	Moderately rapid	Low to moderate	B	
	30–42	Weathered rock	Rapid	Low	B	
Eubanks and Lloyd stony loams (EyD2).	0–3	Loam	Rapid	Low	B	3½ to 10 feet; granodiorite.
	3–9	Silty clay loam	Moderately rapid	Low	B	
	9–18	Clay loam	Moderate	Low to moderate	B	
	18–27	Loam	Moderately rapid	Low to moderate	B	
	27–33	Weathered rock	Rapid	Low	B	
Eubanks-Brandywine complex (EbC, EbD2).	0–10	Loam	Rapid	Low to very low	B	3 to 14 feet; granite and granodiorite.
	10–38	Clay loam and weathered rock.	Moderately rapid and rapid.	Moderate to very low.	B	
Eubanks-Chester complex (EcB, EcC).	0–10	Loam	Rapid	Low to very low	B	5 to 15 feet; granite and granodiorite.
	10–29	Sandy clay loam and clay loam.	Moderately rapid	Low	B	
	29–50	Clay loam and weathered rock.	Moderately rapid to rapid.	Low	B	
Halewood stony fine sandy loam (HaC, HaD, HaE).	0–6	Fine sandy loam	Rapid	Low	B	3 to 10 feet; granodiorite.
	6–9	Light sandy clay loam.	Rapid	Low	B	
	9–24	Sandy clay loam	Moderately rapid	Low	B	
	24–30	Light sandy clay loam.	Moderately rapid	Low	B	
	30–64	Weathered rock	Rapid	Low	B	
Hazel loam (HeC, HeD, HeE).	0–7	Loam	Rapid	Very low	C	2 to 5 feet; phyllite, sandstone, and quartzite.
	7–46	Weathered rock	Moderately rapid	Low	C	
Hazel stony loam (HsD, HsE).	0–14	Loam	Rapid	Very low	C	1½ to 4 feet; variable
	14–16	Weathered rock	Moderate	Low	C	
Hiwassee loam (HwB, HwC).	0–8	Loam	Rapid	Low	B	10 feet +; variable
	8–15	Clay	Rapid	Medium	B	
	15–67	Clay	Rapid	Medium	B	
	67–114	Clay	Moderately rapid	Medium	B	
	114–132	Weathered rock	Moderately rapid	Low	B	

See footnote at end of table.

characteristics of soils—Continued

Minimum depth to water table during wettest periods	Suitability for—					Remarks
	Topsoil	Farm ponds	Septic tanks	Irrigation	Earthwork during prolonged wet periods	
Feet						
4+	Very good	Poor	Good to very good.	Fair	Fair to good	Subject to overflow.
10+	Very good	Good	Good to very good.	Fair	Fair.	
10+	Poor	Good	Good to very good.	Fair to poor	Poor to fair.	
10+	Good	Fair to good	Good	Good	Poor	Old colluvial deposits that washed and rolled from the Blue Ridge Mountains.
10+	Very good	Good	Good	Good	Poor	Subsoil ranges from clay loam, silty clay loam, or silty clay to clay.
10+	Poor	Good to fair	Good	Fair	Poor	Subsoil ranges from sandy clay loam to clay.
10+	Good	Fair	Good	Fair	Poor.	
10+	Very good	Fair to good	Good	Good	Good to poor	In places, hard rock may be a problem in installation of septic tanks on the Brandywine soil.
10+	Good	Good	Good	Good	Good to fair.	
10+	Fair to good	Good	Good	Good	Good.	
10+	Good	Fair	Fair to poor	Fair	Good	Variable parent material; phyllite, sandstone, and quartzite.
10+		Poor to fair	Poor	Poor	Good	Variable parent material; phyllite, sandstone, and quartzite.
10+	Good	Good	Good	Good	Poor	High stream terraces.

TABLE 7.—*Engineering*

Soil type and map symbols	Depth	Dominant texture	Permeability	Shrink-swell potential	Hydrologic rating [1]	Depth to and kind of bedrock
	Inches					
Hiwassee clay loam (HtB3, HtC3).	0–6	Clay loam	Rapid	Medium	B	10 feet +; variable
	6–48	Clay	Rapid	Medium	B	
	48–60	Clay	Rapid	Medium	B	
	60–80	Weathered rock	Moderately rapid	Low	B	
Louisburg sandy loam (LoC, LoD).	0–10	Sandy loam	Rapid	Very low	B	1 to 6 feet; arkosic sandstone and quartzite.
	10–15	Loam	Rapid	Very low	B	
	15–24	Weathered rock	Rapid	Very low	B	
Louisburg soils (LsE)	0–8	Sandy loam	Very rapid	Very low	B	1 to 4 feet; arkosic sandstone, quartzite, and phyllite.
	8–12	Loam	Very rapid	Very low	B	
	12–20	Weathered rock	Very rapid	Very low	B	
Louisburg stony sandy loam (LyC, LyD).	0–12	Sandy loam	Rapid	Very low	B	1 to 4 feet; variable
	12–24	Weathered rock	Rapid	Very low	B	
Made land (Ma)	Variable	Variable	Variable	Variable	Variable	Variable
Meadowville loam (Me)	0–11	Loam	Rapid	Low	B	6 to 14 feet; variable
	11–21	Heavy loam	Moderately rapid	Low	B	
	21–28	Silty clay loam	Moderate	Moderate	B	
	28–36	Sandy clay loam	Moderately rapid	Moderate	B	
	36–41	Weathered rock	Rapid	Low	B	
Myersville stony silt loam (MyC, MyD).	0–5	Silt loam	Rapid	Low	B	2½ to 8 feet; greenstone.
	5–11	Light sandy clay loam.	Rapid	Low	B	
	11–26	Silty clay loam	Moderate	Low to moderate	B	
	26–46	Weathered rock	Moderate	Low	B	
Porters stony loam (PoB, PoC, PoD, PoE).	0–9	Loam	Rapid	Low	B	1½ to 8 feet; granodiorite.
	9–21	Sandy clay loam	Rapid	Low	B	
	21–42	Weathered rock	Rapid	Low	B	
Ramsey stony fine sandy loam (RaE).	0–8	Fine sandy loam	Rapid	Very low	C	1½ to 3½ feet; sandstone and quartzite.
	8–36	Weathered rock	Moderately rapid	Very low	C	
Riverwash (Rd)	0–36	Variable	Very rapid	Very low	A	4 feet; variable
Roanoke silt loam (Re)	0–10	Silt loam	Moderately rapid	Low	D	10 feet plus; variable
	10–13	Sandy clay loam	Moderate	Low to moderate	D	
	13–18	Clay loam	Slow	Moderate	D	
	18–30	Clay	Very slow	Moderate	D	
	30–36	Weathered rock	Moderate	Low	D	
Rock land, acidic (RkD, RkE).	Variable	Variable	Variable	Variable	Variable	0 to 10 feet; variable acidic rocks.
Rock land, basic (RoD, RoE).	Variable	Variable	Variable	Variable	Variable	0 to 10 feet; greenstone.
Rock outcrop (Rp)	Variable	Variable	Variable	None	None	0 to 1 foot; variable
Stony alluvial land (Sa)	0–14	Variable	Variable	Low	A to D	10 feet plus; variable
	14–36	Variable	Variable	Low	A to D	
Stony colluvial land (Sc).	Variable	Variable	Variable	None	None	0 to 12 feet; variable
Stony local alluvial land (StB, StC, StD)	0–13	Loam	Rapid	Low	B	4 to 10 feet; granodiorite
	13–27	Sandy clay loam	Rapid	Low	B	
	27–35	Weathered rock	Rapid	Low	B	

See footnote at end of table.

characteristics of soils—Continued

Minimum depth to water table during wettest periods	Suitability for—					Remarks
	Topsoil	Farm ponds	Septic tanks	Irrigation	Earthwork during prolonged wet periods	
Feet						
10+	Poor	Fair to good	Good	Fair	Poor.	
10+	Fair	Poor to fair	Fair to good	Good	Good	Hard rock on steep slopes may be a problem in installation of septic tanks.
10+	Fair to poor	Poor	Fair to poor	Poor	Good.	
10+	Fair	Poor	Fair to poor	Fair	Good	Hard rock may be a problem in installation of septic tanks.
Variable	Variable	Variable	Variable	Poor	Variable	Made land can be of any material.
3–6	Very good	Good	Fair to poor	Good	Fair to poor	Subject to seepage in places.
10+	Good	Poor to fair	Good	Good	Fair	Subsoil may be clay in places.
10+	Good	Good to fair	Good	Good	Good.	
10+	Poor	Poor to very poor.	Fair to poor	Poor	Good.	
1½	Poor	Very poor	Very poor	Very poor	Poor	Riverwash is sand, gravel, and cobbles that have been deposited along streams.
0–1	Poor	Good to very good.	Very poor	Poor	Very poor	Alluvial deposits on stream terraces.
10+	Poor	Very poor	Poor to good	Poor	Poor	Rocks, 10 to 30 feet apart, cover 25 to 50 percent of the surface area; rocks may limit drainage field.
10+	Poor	Very poor	Poor to good	Poor	Poor	Rocks, 10 to 30 feet apart, cover 25 to 50 percent of the surface area; rocks may limit drainage field.
10+	Very poor	Very poor	Very poor	Very poor	Very poor	Rock outcrops cover more than 90 percent of the surface area.
0–3	Poor	Very poor	Very poor	Very poor	Fair to poor	Subject to frequent overflow; cobbles and gravel throughout.
10+	Very poor	Very poor	Very poor	Very poor	Very poor	Boulders and cobbles cover more than 90 percent of the surface area.
6–10+	Good	Poor to fair	Good to fair	Fair	Good	Old colluvium that washed and rolled from the Blue Ridge Mountains.

TABLE 7.—*Engineering*

Soil type and map symbols	Depth	Dominant texture	Permeability	Shrink-swell potential	Hydrologic rating [1]	Depth to and kind of bedrock
	Inches					
Unison loam (UnB, UnC2, UpB).	0–8	Loam	Rapid	Low	B	6 to 12 feet; granodiorite.
	8–18	Silty clay loam	Moderately rapid	Low	B	
	18–35	Clay loam	Moderate	Low to moderate	B	
	35–43	Silty clay loam	Moderate	Low to moderate	B	
	43–49	Weathered rock	Moderately rapid	Low	B	
Unison cobbly loam (UcB, UcC).	0–8	Loam	Rapid	Low	B	6 to 12 feet; granodiorite
	8–18	Silty clay loam	Moderately rapid	Low	B	
	18–35	Clay loam	Moderate	Low to moderate	B	
	35–43	Silty clay loam	Moderate	Low to moderate	B	
	43–49	Weathered rock	Moderately rapid	Low	B	
Very rocky land (Ve)	Variable	Variable	Variable	Variable	Variable	0 to 12 feet; variable
Wehadkee silt loam (We).	0–8	Silt loam	Moderately slow	Low	D	10 feet plus; variable
	8–23	Silty clay loam	Slow	Low to moderate	D	
	23–30	Silty clay	Very slow	Moderate	D	
	30–42	Clay	Very slow	Moderate	D	
Wickham loam (WhB)	0–10	Loam	Rapid	Low	B	10 feet plus; variable
	10–38	Silty clay	Moderate	Low	B	
	38–52	Clay loam	Moderate	Low to moderate	B	
	52–70	Weathered rock	Moderately rapid	Low	B	
Worsham silt loam (Wo)	0–8	Silt loam	Moderately rapid	Low	D	6 to 10 feet; variable hard rock.
	8–13	Clay loam	Moderate	Moderate	D	
	13–27	Clay	Very slow	Moderate	D	
	27–36	Sandy clay loam	Slow	Moderate	D	
	36–42	Weathered rock	Moderately rapid	Low	D	
Worsham stony silt loam (Ws).	0–15	Silt loam	Slow	Low	D	8 feet; variable
	15–36	Clay	Very slow	Moderate	D	
	36–42	Clay loam	Very slow	Low	D	

[1] Hydrologic ratings are in terms of the ability of the soils to take in water during periods of sustained rainfall. *A* soils take up from 0.30 to 0.45 inch of water per hour; *B* soils, 0.15 to 0.30 inch of water per hour; *C* soils, 0.05 to 0.15 inch of water per hour; and *D* soils, 0 to 0.05 inch of water per hour.

Shrink-swell potential (table 7) is an indication of the volume change to be expected of soil material with changes in moisture content. As the moisture decreases, the soil shrinks; as it increases, the soil swells.

Hydrologic rating (table 7) indicates the ability of the soils to take in water during periods of sustained rainfall. Ratings are based on the whole soil profile and its underlying unconsolidated parent material. To obtain uniformity, it is assumed that the soils have natural drainage and uniform vegetation. The following infiltration rate classes are used in this survey: A, high; B, medium; C, low; and D, very low.

Maximum dry density (table 6) is the highest density obtained when a soil is compacted at the *optimum moisture content*. If soil material is compacted at successively higher content of moisture, assuming that the compactive effort remains constant, the density of the compacted material will increase until the optimum moisture content is reached. After that, the density decreases with increase in moisture content.

Selection of Sites

A site suitable for one kind of structure may not be suitable for another. Tables 6 and 7 provide information useful in selecting sites for several kinds of structures. Further knowledge about the soils can be gained by reading the sections, The Soils of Rappahannock County and Morphology and Genesis of Soils. The following paragraphs point out some of the factors to be considered in selecting sites for farm ponds, roads, and septic tanks.

Farm ponds. The compactibility of a soil and the porosity of the bedrock underlying it are important in determining the suitability of a site for constructing a pond. Information about the kind of soil material and the depth to and kind of parent rock is necessary (see tables 6 and 7). Drainageways or incipient drainageways normally are selected as sites for farm ponds.

Roads.—Many soils in Rappahannock County contain rock fragments. The larger fragments must be crushed if stony soil material is to be used in foundations, pavements, or base courses for roads. The rock fragments make excavation with light equipment difficult and may prohibit use of tamping rollers for compacting soil materials in embankments. Soils with a high percentage of rock fragments and shallow depth to bedrock have the advantage that they can be used for construction in winter.

Construction of roads in poorly drained areas should be avoided if possible. Poorly drained soils have high water tables and, in many places, contain clay particles that shrink and swell. The changes in volume of the

characteristics of soils—Continued

Minimum depth to water table during wettest periods	Suitability for—					Remarks
	Topsoil	Farm ponds	Septic tanks	Irrigation	Earthwork during prolonged wet periods	
10+	Good	Good	Good to fair	Good	Fair to good	Old colluvium that washed and rolled from the Blue Ridge Mountains.
10+	Good	Fair to poor	Good to fair	Fair to poor	Fair to good	Old colluvium that washed and rolled from the Blue Ridge Mountains.
10+	Very poor	Very poor	Very poor	Very poor	Very poor	Rocks, 10 feet apart or less, cover 50 to 90 percent of the surface area.
0–1	Poor	Good to very good.	Very poor	Poor	Very poor	Subject to frequent overflow.
10+	Good	Very good	Good	Good	Poor to fair	Stream terraces.
0–1	Poor	Very good	Very poor	Poor	Very poor	Subject to seepage from higher lying areas.
0–1	Poor	Fair to good	Very poor	Poor	Very poor	Variable water table; water stands on the surface most of the year.

foundation material at different moisture contents depend on the nature of the clay particles. Soils having a high shrink-swell potential are the least desirable. A high water table saturates the foundation material below the road pavement, and the saturated material has less capacity than dry material to bear loads.

The backslopes of road cuts through poorly drained soils tend to slough off or slide because of seepage. The need for interceptor drains or underdrains should be carefully studied. Material from road cuts in poorly drained soils should not be used for embankments unless the wet material can be readily dried to permit proper compaction.

Frost heaving is a hazard where the water table is high, particularly in those soils that contain a high percentage of silt and clay. Soils of this kind, therefore, should not be used in the upper part of a subgrade or in a foundation for pavements. Saturated foundation material that alternately freezes and thaws will eventually contribute to the breakup of the pavement above it. Soils that have a fragipan, the Belvoir and Augusta soils, for example, generally have a high water table.

Soils that contain considerable organic matter are unsuitable for use in any part of the roadway. Such soils, if used, may adversely affect the pavement or another highway structure.

Septic tanks.—For successful installation of septic tanks, the soil materials need to be of the kind that have a suitable percolation rate. The suitability of the various soils as sites for septic tanks are estimated in table 7. The estimates are based on percolation potentials. These ratings are only general guides. Each site should be investigated carefully. Among the properties to be considered are texture and structure of the soil material, amount and kind of clay, and depth to hard, nonporous rock.

Forests of Rappahannock County

The condition of the forests in Rappahannock County today indicates past misuse rather than any lack of suitability of the soils for trees. The trees have been cut heavily for a number of years and the best ones harvested. In some stands only the less desirable trees and cull trees are left.

There are only a few remnants of the original stands, and these are in inaccessible places. In these places one can see the kinds and sizes of the trees that grew in the original forest. White oak, northern red oak, and other hardwoods covered most of the uplands in the county.

[2] This section was prepared by C. S. Coleman with the help of the Virginia Division of Forestry.

Scattered among the hardwoods were a few eastern white pine, pitch pine, shortleaf pine, and Virginia pine.

Mostly chestnut trees were on those ridgetops of the Blue Ridge Mountains that are underlain by greenstone. Here, the Myersville soils developed. On the northern and eastern slopes and at the heads of drainageways, yellow-poplar was most common. Mixed with it were basswood, northern red oak, black oak, white oak, chestnut oak, hickory, black walnut, green ash, black locust, white pine, and hemlock. The chestnut trees have been replaced mainly by poplar.

For the most part, chestnut oak covered those ridgetops that are underlain by granodiorite, the material from which the Porters and Halewood soils were derived. On the slopes, white oak was the dominant tree; mixed with it were black oak, red oak, hickory, yellow-poplar, pitch pine, and white pine. At the foot of the mountains and along the streams flowing out of the mountains, the Dyke, Unison, and other well-drained colluvial soils supported stands of yellow-poplar mixed with white oak, red oak, black walnut, and black locust. In the same positions the Worsham and other poorly drained soils supported stands of pin oak, scarlet oak, red maple, and elm.

Away from the mountains and colluvial foot slopes, stands of hardwoods consisting mainly of white oak grew on the Chester, Brandywine, Lloyd, Culpeper, and Hazel soils. Mixed with the white oak were red oak, black oak, yellow-poplar, black walnut, black locust, hickory, shortleaf pine, and Virginia pine. On the poorly drained alluvial soils along the large streams were red maple, river birch, sycamore, pin oak, and other large water-tolerant trees.

In most places scarlet oak, ailanthus (treeofheaven), sumac, hickory, and Virginia pine have replaced the white oak, red oak, yellow-poplar, white pine, and shortleaf pine. The ailanthus is of Chinese origin. Originally it was planted as a shade tree, but it now grows wild.

Most of the acreage in the county that possibly could be used for crops has been cleared at some time. Now, however, many of these areas have been abandoned and have reverted to forest. The type of forest that grows depends on the kinds and nearness of the seed trees at the time the areas were abandoned for agricultural use. In places near seed trees of Virginia pine, abandoned areas have produced an almost pure stand of Virginia pine. In other places only white pine has reseeded. Yellow-poplar, which seeds naturally when cultivated fields are abandoned, is the most valuable timber in the county today. A large acreage of this tree is in the Shenandoah National Park. None of the timber in the park can be cut, and the stands make good growth.

Formerly, once in every 5 to 10 years fires would burn over most of the woodland in the county; some woods were even burned annually. State fire protection today is vastly improved, and fires are not so frequent. In 1955, there was only one fire, and it burned only 1 acre. In 1956 five fires burned 9 acres. Fires have left many scars and have done much damage to the trees that are now standing. Fungus and insects have entered holes burned in the bark and have rotted the underlying wood. In some trees, internal decay extends halfway up the trunk.

Fires no longer cause much loss of timber from forests in this county. The use of woodland for grazing and the overcutting of desirable trees, however, have greatly diminished yields. Forest actually furnishes little pasture, but the grazing animals do a tremendous amount of damage. They eat and trample most of the desirable young trees and destroy most of the understory vegetation. Strong winds then blow most of the leaves out of the forest. The exposed surface soil soon becomes hard; the rains run off instead of soaking into the soil; and after a few heavy rains, gully erosion starts. Also the sharp hoofs of cattle and horses damage tree roots, and fungus diseases enter and rot the trees.

In the past few years, many farmers have shown an increasing interest in the planting of trees. One good plan is to plant 10 to 15 black walnut and black locust trees in each acre of permanent pasture. These trees require protection in the early years but, when grown, will provide shade for cattle. Also whiteclover and bluegrass grow well under walnut or locust trees and provide good grazing. In addition, as the trees grow large enough, locust makes good fence posts and walnut is valuable lumber for sale.

Many landowners in Rappahannock County who are interested in planting trees would like to know what they can expect in returns from the acreage they plant. In 1954, the Virginia Forest Service studied a 20-year-old plantation of shortleaf pine in adjoining Warren County. This plantation grows on Brandywine loam, moderately steep phase, which is considerably eroded. Large areas of that soil occur in Rappahannock County, and information in table 8 gained from the study can be applied in this county. Shortleaf pine has a site index of 60, which is fair. This site index is the average height these trees attain at 50 years of age.

In 1954, after deducting expenses for taxes, planting, and marketing, the actual annual net return per acre under option 1 was 96 cents. Under option 2, $4.47, and under option 3, $7.62.

According to the 1954 U. S. Census report, a little more than one-fourth of the county is in woodland on farms. The number of small farms in the county is decreasing. Parts of these farms, or entire farms, are abandoned. Virginia pine and black locust are the first trees to invade the abandoned fields, but if seed trees of the yellow-poplar are near, they, too, reforest the areas.

In this county cattle raising is important, and farmers make an effort to improve breeds and to select individual animals that will make the greatest gain and grade the highest. They do not apply this kind of care to their woodlands. Little time or thought is spent on improvement of forest. Lumber markets have improved in the past few years, yet the quality of woodland has consistently declined.

The farmer alone decides which trees to cut. If he is not selective in cutting, his woods will continue to deteriorate. If he applies to his woods the same culling principle the successful farmer and livestock raiser has learned to use with his other crops and his herds, he can gradually eliminate the unprofitable trees. In time, more valuable trees will grow, and profits will increase.

In 1954 the income from forest products made up 2.4 percent of the total income for the county. Standing timber was sold on a few farms, but most farmers harvested their timber for fence posts, firewood, pulpwood,

TABLE 8.—*Yields from a plantation of shortleaf pine under three options*

[Site index 60, or fair]

Standard age in years	Diameter at breast height (DBH)	Basal area	Trees per acre	Volume per acre		Average volume per acre cut	
	Inches	*Sq. ft.*	*Number*	*Cords*	*M bd. ft.*	*Cords*	*M bd. ft.*
1. CLEAR CUT FOR PULPWOOD AT AGE 20 YEARS							
Present stand:							
20	5.0	149.4	1,108	22.2		22.2	
2. THINNING FOR PULPWOOD, CLEAR CUT FOR SAWTIMBER AT AGE 40 YEARS							
Present stand:							
20	5.0	149.4	1,108	22.2		5.0	
Projected stand:							
30	7.0	162	606	30.3		13.4	
40	9.0	120	272	32.6	8.9		8.9
Total						18.4	8.9
3. THINNING FOR PULPWOOD AND SAWTIMBER, CLEAR CUT FOR SAWTIMBER AT AGE 60 YEARS							
Present stand:							
20	5.0	149.4	1,108	22.2		5.0	
Projected stand:							
30	7.0	120	449	22.5		13.4	
40	9.0	120	272	32.6	8.9		2.1
50	11.0	120	182	34.6	13.8		3.1
60	13.0	120	130	39.0	19.6		19.6
Total						18.4	24.8

and sawlogs. According to the census in 1954, 196 farms harvested 2,705 cords (4′ x 4′ x 8′) of firewood; 84 farms, 20,913 fence posts; and 37 farms, 1,707,000 board feet of sawlogs and veneer logs, including standing timber.

Morphology and Genesis of Soils

Soil is the product of soil-forming processes acting on materials deposited or accumulated by geologic agencies. The characteristics of a soil at any given point are determined by (1) the physical and mineralogical composition of the parent material, (2) the climate under which the soil material has accumulated and existed since accumulation, (3) the plant and animal life on and in the soil, (4) the relief, or lay of the land, and (5) the length of time the forces of soil development have acted on the soil material.[3] The effect that any one of these five factors has on soil formation at a given point is strongly influenced by the other four factors.

Climate and vegetation are the active factors of soil genesis. They change the parent material from an inert heterogeneous mass to a natural body with genetically related horizons. Their action on the parent material is aided or hindered in varying degree by the relief, which, in turn, influences surface runoff, the movement of water through the soil, the natural erosion, and the native vegetation. The nature of the parent material affects the kind of profile that can be formed and, in extreme cases, may be the dominant factor. Throughout the genesis of soil, time brings about changes. The time needed for horizon differentiation may be much or little, but some time is always required. Normally, a long period is needed for the development of the soil into a body in equilibrium with its environment. The climate, and its influence on soil and plants, depends not only on temperature, rainfall, and humidity but also on the physical characteristics of the soil or soil material and on the relief.

Factors of Soil Formation

Parent materials.—The parent materials of the soils of Rappahannock County are of two broad classes (1) materials residual from the weathering of rocks in place and (2) materials transported by water or gravity and laid down as unconsolidated deposits of clay, silt, and sand, or as large rock fragments. Materials of the first class are related directly to the underlying rocks from which they were derived; materials of the second class, to the soils or rocks from which they washed or rolled.

The rocks of the county belong to two major age groups —the Precambrian and the Cambrian. For the most part they are Precambrian. The three formations, as listed on the State Geology Map [4] are Catoctin greenstone, Marshall

[3] UNITED STATES DEPARTMENT OF AGRICULTURE. SOILS AND MEN. U. S. Dept. Agr. Ybk., 1232 pp., illus. 1938.

[4] VIRGINIA DIVISION OF MINERAL RESOURCES. GEOLOGIC MAP OF VIRGINIA. 1 map. 1928.

granite, and hypersthene granodiorite. Other formations that occur but are not listed on the State Geology Map are Old Rag granite, Lovingston granite gneiss, Loudoun arkosic quartzite, and Weverton quartzite. The Loudoun and Weverton formations belong to the Unicoi formation, which is of the Cambrian age.

Catoctin greenstone is very extensive in the northwestern part of the county in the Blue Ridge Mountains. It extends northward, from Panorama, where U. S. Highway No. 211 crosses the Skyline Drive, to Front Royal. The Catoctin and Myersville soils formed in material from this formation. This rock formation is volcanic in origin and is classified as metamorphosed igneous (metaigneous).

In the northwestern part of the county is a small area that the greenstone lava flow did not cover. This belongs to the Unicoi formation, which consists of sandstone and quartzite. This rock formation is located between Pass Mountain and Jeremys Run Overlook. The Ramsey soil formed in material from this rock. The formation is sedimentary in origin.

In the southeastern part of the county near Scrabble and Viewtown are the Loudoun and Weverton formations of Cambrian age. This area is sedimentary and includes arkosic sandstone, quartzite, and phyllite. The Louisburg, Culpeper, Albemarle, and Hazel soils formed in this area.

The largest part of the county is underlain by igneous rocks. This large area of Precambrian age rocks is very complex and mixed. It includes Marshall granite, Old Rag granite, granodiorite, and Lovingston granite gneiss. The Brandywine, Eubanks and Lloyd, Chester, Porters, and Halewood are the most extensive soils formed in this area.

Climate.—The climate of Rappahannock County is of the warm, continental type. The average annual rainfall is 41.27 inches; the average temperature in summer is 73.9° F.; and that in winter 35.7° (see table 1, page 4). The western part of the county has a higher average elevation than other parts of the county and, therefore, is somewhat cooler throughout the year. Also, precipitation is heavier and there is more snow than in the lower areas. The high rainfall throughout the county causes fairly intense downward leaching of soluble materials and colloidal material in the soil. The soil is frozen for only short periods, especially in the valley area, and to only shallow depths. The amount of weathering and translocation of materials is, therefore, further intensified. Because of soil leaching, free carbonate of lime has not accumulated in the soils, although calcium is present in the mineral components of many of the rocks. Most of the soils are acid; the reaction ranges from very strongly acid to slightly acid.

The climate of the Piedmont section of the county is relatively uniform, although small, local variations exist because the areas vary in degree of slope and in position on the landscape. These local differences in climate may cause some of the local variations in soil types, but the differences in climate over the entire Piedmont section are not great enough to account for the broad differences that exist among the soils. On the other hand, it appears that the climate accounts not only for some of the outstanding properties that many of the soil have in common, but also for some of the broad differences that exist between soils on the Piedmont Plateau and those on the mountains.

Plant and animal life.—Biologic forces have had an important role in the formation of soil. Trees, shrubs, grasses, and other herbaceous plants and micro-organisms, earthworms, and various other forms of plant and animal life live on and in the soil and are active agencies in the soil-forming processes. The kinds of plants and animals that live on and in the soil are determined by environmental factors, which include climate, parent material, relief, age of the soil, and the associated organisms. Micro-organisms decompose raw plant waste into organic matter and incorporate it into the soil. Plants provide organic matter for the soil and bring moisture and plant nutrients from the lower to the upper soil horizons. The types of vegetation and of soil organisms are to large extent controlled by climate. Where the variation in either climate or vegetation is significant, the general type of soil varies accordingly.

A hardwood or hardwood and pine forest covered most of the soils in Rappahannock County. There were probably differences in the density of stands, the relative proportion of species, and the associated ground cover. Taking the area as a whole, however, the forests, except at high elevations, appear to have been relatively uniform; it is doubtful if any of the marked differences in properties among the well-drained, well-developed soils are the direct result of differences in vegetation.

Most of the trees that grow in this area are moderately deep to deep feeders on plant nutrients in the soil. They are chiefly deciduous trees that shed their leaves annually. The leaves from different kinds of trees differ considerably in content of plant nutrients. Generally, leaves from deciduous trees return larger amount of bases and phosphorus to the soil than coniferous trees. Much organic matter is added to the soil in the form of dead leaves, roots, and entire plants. Most of it is added to the A horizon, where it is acted upon by micro-organisms, earthworms, and other forms of life and by direct chemical reactions. In Rappahannock County such material decomposes fairly rapidly because of favorable temperature, moisture content, condition of the organic matter, and micropopulation in the soil. Less organic matter accumulates in the well-drained sites in the Piedmont part of the county than in the cooler Blue Ridge Mountains.

Little is known of the micro-organisms, earthworms, and other population in the soils of the county. The population in the soil is important in its genesis, but the effects have not been adequately determined.

Relief.—The relief, or lay of the land, varies from nearly level to very steep. The principal factors of relief affecting soil development are internal drainage, surface runoff, and geologic erosion. It is apparent that differences in relief during the soil formation have greatly influenced the development of different properties in the soil. The normal soils developed in gently sloping to rolling, well-drained areas where geologic erosion was normal. On steep slopes, soil materials are constantly removed and do not remain in place long enough for a normal profile to develop. On these steep slopes, surface runoff is great; percolation of water through the soil is small; translocation of soil material is small; and geologic

erosion keeps even pace with rock weathering and soil formation.

Soils that have a yellowish B horizon occupy the nearly level to gently sloping areas where drainage is imperfect. Mottled soils formed in level areas or depressions where drainage is poor. Relief has so minimized the effects of parent material in soil development that in many places several soils have formed from the same parent material.

Age.—Differences in age account for differences among some of the soils. If a soil is old, or mature, it shows well-defined, genetic horizons. If a soil is young, or immature, it shows little or no genetic horizonation. All of the soils in this county have required some time to develop their characteristics. Soils of the first bottoms and the recent colluvial soils are young because they have not been influenced by climate, vegetation, and time to a degree that would permit well-defined, genetically related profiles. Other young soils are on steep slopes where soil material is lost from the surface through normal erosion as fast as it forms from the parent material. The soil material of these shallow soils is young, although geologically it may be very old.

Mature soils are those that have been in place for a long time and have approached equilibrium with their environment.[5] Geologic erosion normally is slow, and highly leached A horizons form. Such soils are very old. The soils of Rappahannock County range in age from very young to very old, but for the most part they are intermediate in age.

Classification of Soils

The soils of Rappahannock County are classified according to order, great soil group, and soil series as shown in table 9. The parent material, topographic position, dominant relief, slope range, permeability, and profile development are shown for each series. Study of this table will enable the reader to understand more easily the genetic relationships of the soils of the county.

Zonal soils

Zonal soils have well-developed soil characteristics that reflect the influence of the active factors of soil genesis—climate and living organisms (chiefly vegetation).[6] The zonal soils in Rappahannock County are in the Red-Yellow Podzolic, Gray-Brown Podzolic, and Reddish-Brown Lateritic great soil groups.

In areas where the parent materials have been in place a long time and have not been subject to extreme conditions of relief or of the parent materials themselves, the soils that have developed have the characteristics of zonal soils. In virgin areas, all of the well-drained, well-developed soils have a surface layer of organic debris in varying stages of decomposition. All have a dark-colored A_1 horizon; the A_2 horizon is lighter in color than either the A_1 or the B. The B horizon is generally uniformly colored yellow, brown, or red and is heavier textured than the A_1 or A_2. The C horizon varies in color and texture among the different soils, but it is normally light red or yellow and is lighter in texture than the B horizon.

[5] See footnote 3, p. 71.

[6] See footnote 3, p. 71.

RED-YELLOW PODZOLIC SOILS

The Red-Yellow Podzolic soils are a group of well-developed, well-drained, acid soils that have a thin organic A_0 horizon and an organic-mineral A_1 horizon, which overlies a light-colored, bleached A_2 horizon. This, in turn, overlies a yellowish-red or yellow, more clayey B horizon. Red-Yellow Podzolic soils developed under deciduous, coniferous, or mixed forest in warm-mesothermal or tropical, humid to subhumid climates. In cultivated areas the A_0 and A_1 horizons are incorporated in the plow layer. In many places accelerated erosion has removed all or nearly all of the A horizon and the B horizon is exposed.

Kaolinite is generally the most important clay fraction in Red-Yellow Podzolic soils, but vermiculite and gibbsite are also significant. Hydrous mica and montmorillonite dilute the clay fraction in some of the soils, but this dilution is not typical. In any specific parent material, reticulate streaks generally occur at less depth in yellow B horizons than in red B horizons. In a few members of this group, especially the very sandy ones, this streaked material may be absent.

The Red-Yellow Podzolic soils of Rappahannock County are of the Albemarle, Altavista, Culpeper, Eubanks and Lloyd, Halewood, Unison, and Wickham series. The Lloyd soils, though classified as Red-Yellow Podzolic soils, have some characteristics of the soils in the Reddish-Brown Lateritic great soil group. Their profile is intermediate in color between those of the ortho Red-Yellow Podzolic soils and the ortho Reddish-Brown Lateritic soils.

GRAY-BROWN PODZOLIC SOILS

Gray-Brown Podzolic soils are zonal soils that have a comparatively thin organic covering and organic-mineral layers grading to a grayish-brown, leached A horizon that rests upon an illuvial B horizon. The soils developed under deciduous forest in a temperate, moist climate. They have a surface covering of leaf litter, generally from deciduous trees; a dark, thin, mild (only slightly acid or moderately acid) humus, somewhat mixed with mineral soil; a grayish-brown, crumb-structured, loamy A_1 horizon above a light grayish-brown or grayish-yellow A_2 horizon; and a moderately heavy, nut-structured, yellowish-brown, brown, brownish-yellow, or reddish-brown B horizon that becomes lighter in color as the depth increases. The total depth of the solum varies considerably but seldom exceeds 4 feet. Podzolization is the main process in the development of these soils.[8]

Rappahannock County is in the transition zone between the Red-Yellow Podzolic and the Gray-Brown Podzolic great soil zones. These groups are locally intermixed and transitional in character; there is no sharp line of demarcation between their general areas. Soils that have characteristics of the Gray-Brown Podzolic soils are those of the Chester, Myersville, Porters, and Meadowville series. The absence of a B horizon in some profiles of the Porters series indicates that these soils grade

[7] The Red-Yellow Podzolic great soil group was once classified as two groups—Red Podzolic soils and Yellow Podzolic soils. Marbut called them "Red and Yellow soils." The separation of the soils on basis of color was abandoned because the reason for the difference in color could not be determined.

[8] See footnote 3, p. 71.

TABLE 9. *Soil series classified by higher categories, and factors that have contributed to differences in their formation*

ZONAL SOILS

Great soil group and series	Parent material	Topographic position	Dominant slope	Slope range	Permeability	Profile development
Red-Yellow Podzolic soils:						
1. Central concept:				*Percent*		
Albemarle	Arkosic sandstone, quartzite, and phyllite.	Uplands; smooth interstream ridges.	Gently sloping	2–14	Moderate	Strong.
Altavista	Moderately young alluvium from acidic rocks.	Moderately low stream terraces.	Nearly level	0–7	Moderate	Medium.
Culpeper	Arkosic sandstone, quartzite, and phyllite.	Uplands; smooth interstream ridges.	Sloping	2–25	Rapid	Strong.
Eubanks	Granodiorite, Marshall granite, and Lovingston granite.	Uplands; interstream ridges and slopes.	Sloping	2–25	Moderately rapid	Strong.
Halewood	Marshall granite and granodiorite	Foothills in Blue Ridge Mountains.	Steep	7–25+	Moderately rapid	Strong.
Unison	Granodiorite and colluvium from greenstone.	Medium high mountains	Gently sloping	2–14	Moderate to moderately rapid.	Medium.
Wickham	Moderately old alluvium from acidic rocks.	Medium high stream terraces	Gently sloping	2–7	Moderate	Medium.
2. Grading toward Reddish-Brown Lateritic soils:						
Lloyd	Granodiorite, Marshall granite, and Lovingston granite.	Uplands; interstream ridges and slopes.	Sloping	2–25	Moderately rapid	Strong.
Gray-Brown Podzolic soils:						
1. Central concept:						
Chester	Granodiorite, Marshall granite, and Lovingston granite.	Uplands; smooth interstream ridges and slopes.	Gently sloping	2–14	Rapid	Medium.
Myersville	Greenstone	Blue Ridge Mountains	Sloping	7–25	Moderate	Strong.
2. Grading toward Lithosols:						
Porters	Granodiorite	Blue Ridge Mountains	Steep	2–45	Moderately rapid	Weak.
3. Grading toward Alluvial soils:						
Meadowville	Moderately young colluvium	Base of slopes and depressions	Gently sloping	2–7	Moderate	Weak.
Reddish-Brown Lateritic soils:						
Dyke	Old colluvium from greenstone and granodiorite.	High mountains	Gently sloping	2–14	Rapid	Strong.
Hiwassee	Old alluvium from basic rocks	High stream terraces	Sloping	2–14	Rapid	Strong.

Intrazonal Soils						
Planosols:						
Augusta	Moderately young alluvium from acidic rocks.	Low stream terraces	Nearly level	0–7	Moderately slow	Very strong.
Belvoir	Marshall granite, sandstone, and granodiorite.	Toe slopes and upland flats	Gently sloping	2–7	Slow	Very strong.
Roanoke	Moderately young alluvium from acidic rocks.	Very low stream terraces	Nearly level	0–2	Very slow	Very strong.
Worsham	Moderately young colluvium	Upland drainageways	Gently sloping	0–7	Slow to very slow	Very strong.
Low-Humic Gley soils:						
Wehadkee	Moderately young alluvium	Low first bottoms	Nearly level	0–2	Slow to very slow	Weak.
Azonal Soils						
Lithosols:						
Brandywine	Marshall granite, Lovingston granite, and granodiorite.	Upland slopes and small mountains.	Moderately steep	2–45+	Rapid	Weak.
Catoctin	Greenstone	Blue Ridge Mountains	Steep	25–45 +	Rapid	Weak.
Hazel	Phyllite, sandstone, and granite mixed.	Upland slopes and small mountains.	Moderately steep	7–25+	Rapid	Weak.
Louisburg	Arkosic sandstone, quartzite, and phyllite.	Upland slopes and small mountains.	Moderately steep	7–25+	Very rapid	Weak.
Ramsey	Sandstone and quartzite	Blue Ridge Mountains	Steep	14–45+	Very rapid	Weak.
Alluvial soils:						
Buncombe	Young alluvium	High first bottoms	Nearly level	0–2	Very rapid	Weak.
Chewacla	Young alluvium	Intermediate first bottoms	Nearly level	0–2	Moderate to moderately slow.	Weak.
Congaree	Young alluvium	High first bottoms	Nearly level	0–2	Rapid	Weak.

toward the Lithosol great soil group. The weak horizonation of the Meadowville soils indicates that they grade toward the Alluvial great soil group.

REDDISH-BROWN LATERITIC SOILS

Reddish-Brown Lateritic soils are zonal soils that have a dark reddish-brown, granular surface layer; a red, friable clay subsoil; and red or reticulately mottled lateritic parent material. They developed under tropical climate having wet and dry seasons and under tropical forest vegetation.[9]

Although Rappahannock County does not have the climate and vegetation generally conducive to formation of soils in the Reddish-Brown Lateritic group, the Dyke and Hiwassee soils in the county have characteristics similar to those of that great soil group. All of the soils in the group formed from parent materials that are comparatively high in bases. Because of the extreme basic nature of their parent rocks, Reddish-Brown Lateritic soils may be intrazonal soils rather than zonal soils, although all of them exhibit a normal soil profile. Their well-drained, well-developed profile has a reddish-brown or red, friable A horizon and a uniformly red or dark-red, firm B horizon that is thicker and finer textured than the A horizon.

Laterization, with little or no podzolization, has dominated soil development. Laterization is the process of the removal of silica from the soils and the consequent increase in their alumina and iron content and a decrease in their base-exchange capacity. Reddish-Brown Lateritic soils do not have the podzolic morphology and light-gray A_2 horizon characteristic of the geographically associated Red-Yellow Podzolic soils.

Intrazonal soils

Intrazonal soils have more or less well-developed soil characteristics that reflect the dominating influence of some local factor of relief or parent material over the normal effect of the climate and vegetation. Each group of these soils may be associated with two or more of the zonal groups. The intrazonal soils in Rappahannock County are in the Planosol and Low-Humic Gley great soil groups.

PLANOSOLS

Planosols are intrazonal soils that have one or more horizons abruptly separated from, and sharply contrasted to, an adjacent horizon because of cementation, compaction, or high content of clay. These soils developed under forest or grass vegetation in a mesothermal to tropical, subhumid to semiarid climate. Ordinarily they have a fluctuating water table. In many places, a cemented or compacted horizon lies beneath a moderately well developed to well developed B horizon that has a higher percentage of clay than the A horizon.

In Rappahannock County the Planosols are moderately well drained to poorly drained. They are nearly level to gently sloping, and their water table, although fluctuating with alternate wet and dry weather, is fairly high. Natural erosion and runoff have been low, and the soils receive much of the runoff from the higher and better drained areas. Their humid internal condition restricts aeration and the reduction of iron and manganese compounds. The Planosols of Rappahannock County are of the Augusta, Belvoir, Roanoke, and Worsham series.

LOW-HUMIC GLEY SOILS

Low-Humic Gley soils are poorly drained intrazonal soils that have a thin A_1 horizon. They lack abrupt boundaries between horizons, and the layers in the profile may or may not differ appreciably in texture. Marked effects of gleying are shown by their grayish, mottled appearance. Most Low-Humic Gley soils are medium acid to very strongly acid, but a few are neutral to alkaline in reaction. Characteristically, they form under a cover of swamp forest.

The Wehadkee are the only Low-Humic Gley soils in Rappahannock County. They occupy first bottoms that are intermittently flooded. Their profile shows the effect of gleying, but otherwise these soils differ little from the alluvial soils. Thus, the Wehadkee soils in this county are classified in the Low-Humic Gley group, but they grade toward the Alluvial group.

Azonal soils

Azonal soils do not have well-developed profile characteristics, either because they are young or because conditions of parent material or relief have prevented the development of a normal, or zonal, profile.

The Azonal soils in Rappahannock County are in the Lithosol and the Alluvial great soil groups. In some areas the parent material has been in place a long time, but the slopes are so steep that runoff is high and geologic erosion has kept pace with the soil-forming processes. These are essentially A-C soils, or soils that have little or no subsoil development. In young soils formed in recent colluvium and alluvium, soil profiles have not had time to develop. These are members of the Alluvial great soil group.

LITHOSOLS

Lithosols are azonal soils that have no clearly expressed soil morphology. They consist of a freshly and imperfectly weathered mass of rock fragments and are largely on steeply sloping land. These soils occupy positions in which geologic erosion is fairly rapid. Generally, the soil materials erode easily and are removed from the surface or are extensively mixed. Thus, the soil-forming processes have not acted on the soil material long enough to produce well-defined genetic soil characteristics.

Lithosols have a fairly definite A_1 horizon and, in places, a faintly developed A_2 horizon, but there is no discernible B horizon. The underlying C horizon, or parent material, may or may not be deeply weathered into the bedrock. The Lithosols in Rappahannock County are of the Brandywine, Catoctin, Hazel, Louisburg, and Ramsey series.

ALLUVIAL SOILS

Alluvial soils are azonal soils that developed from transported and somewhat recently deposited alluvium. They are characterized by a weak modification (or none) of the original material by soil-forming processes.

The Alluvial great soil group in Rappahannock County consists of soils that formed in alluvial materials. The

[9] THORP, J., AND SMITH, GUY D. HIGHER CATEGORIES OF SOIL CLASSIFICATION: ORDER, SUBORDER, AND GREAT SOIL GROUPS. Soil Sci. 67: 117–126, illus. 1949.

factors of climate, plant and animal life, and time have had very little part in the formation of these soils. Their differences are largely derived from differences in parent material and in natural drainage caused by relief. In this county, Alluvial soils are of the Buncombe, Chewacla, and Congaree series.

Catenas

Soils in each of the three broad categories—zonal, azonal, and intrazonal—may be derived from similar kinds of parent material. Within any one of these categories, however, major differences among soils appear to be closely related to differences in the kinds of parent material from which the soils were derived. A group of soils derived from similar parent material that differ greatly in characteristics because of differences in relief and drainage under which they have developed is called a soil catena. The Brandywine, Eubanks and Lloyd, Chester, and Belvoir soils, which developed over Marshall granite, Lovingston granite, and granodiorite, comprise such a group. Within this catena several great soil groups are represented. For example, Brandywine soils are Lithosols; Eubanks and Lloyd soils are the red members of the Red-Yellow Podzolic great soil group; Chester soils are in the Gray-Brown Podzolic great soil group; and the Belvoir soils are Planosols.

Soil Survey Methods and Definitions

The scientist who makes a soil survey examines soils in the field, classifies them in accordance with facts that he observes, and maps their boundaries on an aerial photograph or other map.

Field Study.—The soil surveyor bores or digs many holes to see what the soils are like. The holes are not spaced in a regular pattern but are located according to the lay of the land. Normally they are not more than a quarter of a mile apart, and sometimes they are much closer. In most soils each boring or hole reveals several distinct layers, called *horizons*, which collectively are known as the soil *profile*. Each horizon is studied to see how it differs from others in the profile and to learn the things about the soil that influence its capacity to support plant growth.

Color is usually related to the amount of organic matter. The darker the surface soil, as a rule, the more organic matter it contains. Subsoil colors generally reflect differences in parent material or soil development. Streaks and spots of gray, yellow, and brown in the lower layers generally indicate poor drainage and poor aeration.

Texture, or the content of sand, silt, and clay, is determined by the way the soil feels when rubbed between the fingers. Later it is checked by laboratory analyses. Texture determines how well the soils retain moisture, plant nutrients, and fertilizer and whether they are easy or difficult to cultivate.

Structure, which is the way the individual soil particles are arranged in larger grains and the amount of pore space between grains, gives us clues to the ease or difficulty with which the soil is penetrated by plant roots and by moisture.

Consistence, or the tendency of the soil to crumble or stick together, indicates whether it is easy or difficult to keep the soil open and porous under cultivation.

Other characteristics observed in the course of the field study and considered in classifying the soils include the following: The depth of the soil over bedrock or compact layers; the presence of gravel or stones in amounts that interfere with cultivation; the steepness and pattern of slopes; the degree of erosion; the nature of the underlying parent material from which the soil has developed; and the acidity or alkalinity of the soil as measured by chemical tests.

Classification.—On the basis of the characteristics observed by the soil scientists or determined by laboratory tests, soils are classified by soil series, types, and phases.

Soil series.—A group of soils developed from similar parent material is called a soil series if, except for texture of the surface soil, these soils have similar charcteristics within the profile. The soils in a soil series can have variations in slope or in other features external to the soil profile if these variations do not affect the profile characteristics. Each series is named for the locality where the series was first recognized.

Soil type.—Soils that are similar in kind, thickness, and arrangement of soil layers are classified as one soil type. The texture of the surface soil determines the number of soil types in a series. Thus, Brandywine gritty loam, Brandywine loam, Brandywine rocky loam, Brandywine silt loam, and Brandywine stony loam are soil types within the Brandywine series.

Soil phase.—Variations within the soil type, generally based on such external characteristics as relief, stoniness, accelerated erosion, or depth of surface soil, are designated as soil phases. Brandywine gritty loam, gently sloping phase; Brandywine gritty loam, sloping phase; and Brandywine gritty loam, moderately steep phase, are examples of phases in Rappahannock County that originate from differences in relief.

The soil phase (or the soil type if it has not been subdivided) is the unit shown on the soil map. It is the unit that has the narrowest range of characteristics. Use and management practices, therefore, can be specified more easily than for a soil series or for broader groups that contain more variations.

Miscellaneous land types.—Areas of land that have little or no true soil are not classified by series, types, and phases but are identified by descriptive names. Examples in Rappahannock County, Va., are Alluvial land and Riverwash.

Soil complex.—If two or more soils are so intricately associated in small areas that it is not feasible to show them separately on the soil map, they are mapped together and called a soil complex. An example in this county is Eubanks-Chester complex, gently sloping phases.

Undifferentiated soil group.—Two or more soils that are not regularly associated geographically may be mapped as a single group of undifferentiated soils. An example of such a group in this county is Eubanks and Lloyd loams, gently sloping phases.

Definitions.—Standard definitions of soil characteristics are essential if knowledge about soils is to be trans-

ferred accurately. Many definitions of soil terms will be found in the Glossary at the back of this report.

Agriculture

Rappahannock County is primarily agricultural. Most of the crops grown on the farms are used locally for food or feed for livestock. The data in the following pages were taken from the United States Census of Agriculture.

Land Use, and Size and Type of Farms

The acreage in farms in Rappahannock County has been steadily declining. The land in farms decreased from 140,561 acres in 1930 to 108,246 in 1954. This is a decrease of nearly 25 percent in a 24-year period. The number of farms 3 acres to 500 acres in size has decreased because small farms have been combined into larger ones. Farms larger than 500 acres and smaller than 3 acres have increased in number.

In 1954, the land reported in farms was 108,246 acres, or 63.3 percent of the total land in the county. Of this, 21,210 acres was harvested cropland; 1,686 acres was cropland not harvested and not pastured; 11,870 acres was cropland used only for pasture; 41,015 acres was in other pasture; 6,258 acres was pastured woodland; and 26,207 acres consisted of homesites, woodland not pastured, wasteland, and roads. Nearly half of the 62,634 acres of nonfarm land is in the Shenandoah National Park.

In 1954, full owners operated 476 farms, or 81.7 percent of the farms in the county; part owners 56 farms, or 9.6 percent; tenants 42 farms, or 7.2 percent; and managers 9 farms, or 1.5 percent. Tenancy decreased from 11.3 percent in 1945 to 7.2 percent in 1954. In the later year, 10 farmers were cash tenants, 10 were share tenants and croppers, and 22 were tenants of other kinds.

Crops

Table 10 lists the acreage of principal crops and the number of fruit trees in Rappahannock County in stated years.

Corn

Since 1939, the acreage of corn harvested for grain has steadily declined, but the production of corn per acre has increased from 37.7 bushels in 1939 to 43.8 bushels in 1949. In 1954, however, the average acre yield of corn in the county was only 30.6 bushels. This was because the corn crop was damaged by hurricanes and other adverse weather. Normally, the acre yield of corn increases from year to year as the result of improved practices of soil conservation, of growing hybrid corn on soils well suited to it, and of more intensive use of fertilizer and lime.

More than 90 percent of the corn now grown is hybrid. Many farmers use a mechanical harvester with a corn-picking attachment at harvest time. Other farmers cut, shock, and shuck the corn in the field. The corn fodder is used mostly to feed livestock. Experimental tests show that yields of corn are greater on Meadowville loam and other loamy soils on gentle slopes than on shallow Brandywine loams and similar soils on steeper slopes.

TABLE 10.—*Acreage of the principal crops and number of fruit trees of bearing age in stated years*

Crops	1929	1939	1949	1954
	Acres	*Acres*	*Acres*	*Acres*
Corn harvested for grain	8,694	8,164	4,276	2,861
Wheat threshed or combined	3,054	2,821	1,632	935
Oats threshed or combined	362	146	363	759
Barley threshed or combined	23	448	419	373
Rye threshed or combined	309	778	78	110
Hay crops, total	6,186	10,842	11,034	10,479
Clover or timothy, alone or mixed	5,023	2,886	3,148	2,602
Lespedeza		5,855	5,382	1,947
Alfalfa, alone or mixed	150	53	748	1,276
Small grains cut for hay	2	39	219	678
Other hay cut	1,011	2,009	1,537	3,976
Irish potatoes harvested for home use or for sale	174	122	[1] 86	[2] 29
	Number [3]	*Number* [3]	*Number* [3]	*Number*
Apple trees	245,878	212,820	160,950	120,021
Peach trees	10,251	12,761	7,759	6,791

[1] Does not include acreage for farms with less than 15 bushels harvested.

[2] Does not include acreage for farms with less than 20 bushels harvested.

[3] Number in census year, which is one year later than the crop year given at the head of the column.

Wheat

Since 1929, the acreage in wheat has declined. In 1954, a total of 24,964 bushels was produced on 935 acres. About two-thirds of the wheat is harvested with binders and later threshed; the rest is harvested with combines. Each year the proportion of wheat harvested with combines increases. Part of the wheat is sold to the mills at Luray, some is sent to Baltimore, and a considerable part is used for feed on the farm. Most of the wheat is grown on the Eubanks and Lloyd, Chester, Culpeper, Hiwassee, Brandywine, and Dyke soils. The acreage in wheat is larger than that of oats, rye, or barley. In 1954, the yield of oats was 25,808 bushels; of rye 1,725 bushels; and of barley 14,065 bushels.

Hay

The total acreage in hay crops has changed very little since 1939 even though the number of cattle has steadily increased. In the 5-year period from 1949 to 1954, the acreage of alfalfa nearly doubled, but this increase has been offset by a decrease of more than 60 percent in the acreage of lespedeza and of about 20 percent in the acreage of clover.

Pasture

More than 50 percent of all land in farms is in pasture. Grazing, therefore, is important in the county, but many farms have too much land suitable only for pasture and not enough land suited to winter feed crops.

The most extensive pasture plants grown in the county are orchardgrass, bluegrass mixed with whiteclover, and

lespedeza. A mixture of ladino clover and orchardgrass used to be widely grown, but 3 successive dry years—1952, 1953, and 1954—killed off most of it. Kentucky 31 fescue mixed with ladino clover is successfully grown on the Wehadkee, Augusta, and other wet soils.

Pasture is grown to some extent on nearly all the soils in the county. The soils best suited to ladino clover and mixtures containing ladino clover are the Eubanks, Chester, Belvoir, Meadowville, Augusta, Unison, Wickham, Hiwassee, Dyke, and Culpeper soils and most soils on the bottom lands. The Hazel, Brandywine, Porters, and Myersville soils are not well suited to mixtures containing ladino clover, but they are suited to bluegrass and white clover.

To keep the pasture plants growing well, broomsedge and weeds ought to be clipped at least once before they go to seed. Adequate amounts of lime and fertilizer should be applied. Most pastures in the county are not adequately fertilized. Many pastures have received enough lime, but many others have not.

Apples and peaches

Apples and peaches are the main tree fruits, although in 1954 the acreage was about half that reported in 1940. On many farms apples are the main source of income. Apple trees in 1954 produced 618,621 bushels on 164 farms, and peach trees produced 15,268 bushels on 30 farms.

Livestock and Livestock Products

Table 11 lists the number of livestock in the county in stated years. Livestock eat most of the grain, forage, and hay grown in the county. In 1954, the income from the sale of livestock and livestock products was 44.9 percent of the total farm income. The sale of crops brought 52.7 percent and that of forest products 2.4 percent. Since 1949, the number of cattle in the county has increased steadily. This increase is a result of an increase in beef cattle, mostly commercial cow and calf herds. The calves are raised mostly for the feeder market.

Several commercial dairy herds provide milk for the Washington, D. C. area. Most farmers keep two or three Guernseys or Jersey milk cows for home use.

The most popular breeds of hogs are the Yorkshire, Poland-China, Hampshire, and Berkshire. There are no commercial hog raisers, but a number of farmers sell 15 to 50 hogs per year. Prices for hogs vary considerably because the ratio of corn prices to hog prices varies. When corn is expensive and hogs are cheap, the number of hogs raised for market is small. The number of hogs and pigs sold alive in 1954 was less than half that sold in 1949, for in 1954 hogs and pigs were cheap and the price of corn was supported.

Most farmers in the county raise chickens—Leghorns, New Hampshires, and Rhode Island Reds—to supply eggs and fowl for home use. Most of the eggs in the county, however, come from the poultry farms of commercial producers. DeKalb hybrids are the most popular layer hens. Few broilers are raised for the market, but some are raised for home use.

Some farmers have small flocks of sheep that they raise in conjunction with beef cattle, but there are no commercial flocks. Because most farms are being mechanized, the number of draft horses has decreased, but high-grade Percherons are used to some extent. Halfbred and thoroughbred hunters are used for riding and hunting. Several herds of milk goats graze the rough, steep pastures.

TABLE 11.—*Number of livestock, in stated years*

Livestock	1930	1940	1950	1954
	Number	*Number*	*Number*	*Number*
Cattle and calves	9, 857	[1] 9, 996	13, 335	13, 886
Milk cows	3, 046	2, 850	2, 772	2, 100
Horses and colts	2, 137	[1] 1, 655	1, 172	694
Mules and mule colts	255	[1] 235	77	44
Hogs and pigs	5, 886	[2] 4, 130	5, 902	3, 277
Sheep and lambs	10, 758	[3] 3, 994	4, 452	2, 969
Chickens	[1] 45, 046	[2] 41, 862	[2] 34, 148	[2] 28, 552
Turkeys raised	4, 683	3, 308	1, 280	525
Beehives	700	498	797	[4]

[1] More than 3 months old.
[2] More than 4 months old.
[3] More than 6 months old.
[4] Not reported.

Additional Facts About the County

This section is provided mainly for those who are not familiar with the county. It gives general information about the water supply, vegetation, settlement and population, industries, transportation and markets, and cultural facilities.

Water Supply

Springs, wells, streams, and ponds provide adequate water for the people and livestock in the county. Except during long droughts, the large streams maintain a steady flow. The small streams, shallow wells, and small springs are the first to go dry in periods of dry weather. The mountain springs and deeper wells usually maintain their flow during these periods.

Nearly all parts of the county have good springs, and many farmers depend on these springs for their water. The town of Washington obtains its main water supply from a large spring in Big Jenkins Mountain. During droughts it also obtains water from deep wells.

Farm ponds have been built by many farmers to supply water for livestock in dry seasons (fig. 18). These ponds are built in places that will encourage a good distribution of grazing.

Many of the streams have a watershed that is largely pasture and forest. The larger streams are discolored with silt and other soil particles for a short time after a heavy rain, but the streams that flow out of the Blue Ridge Mountains are usually clear, and they have a considerable fall. Sites of abandoned water-powered grain mills are along the large streams, but only one water-powered grain mill is still used. This mill is on the Thornton River near Sperryville.

Forests

Before Rappahannock County was settled, most of the area was covered with forest, mainly mixed hardwoods and a few shortleaf, pitch, Virginia, and white pines. There was little undergrowth. White oak and

Figure 18.—**Farm pond.**

chestnut trees were the most numerous, and scattered among them were giant yellow-poplar, huge red oak, basswood, and hickory. On the well-drained and more basic soils, walnut and black locust were common and grew to a large size. Stands of the large eastern hemlock grew on the steep northern slopes of the mountains and along streams. On mountain tops, especially on the rocky, southern exposure, were Table-Mountain pine. In some places, severe windstorms uprooted trees. Later, white pine filled in these spots.

The forest now consists mainly of sprouts and cutover stands of cull trees. Approximately 25 percent of the county is in forest.

Settlement and Population

The British and some French Huguenots and Germans from eastern Virginia moved up the Rappahannock River about 1730 to begin settlement of the area that is now Rappahannock County. Rappahannock is an Indian name, which means "the people of the ebb and flow stream." [10] In 1749, George Washington and other engineers mapped Washington, which was later established as a town on December 14, 1796. Today the streets have the same names and lots have the same numbers that George Washington listed when he surveyed the town. Orange County and then Culpeper, when it was separated from Orange County, used to include the area that is now Rappahannock County. On February 8, 1833, Rappahannock was established as a separate county.

In 1840, the population of Rappahannock County was 9,259; in 1950, it was 6,112. Between 1940 and 1950, the population has decreased 15.2 percent. Except in the mountains, this population is evenly distributed. According to the 1950 census, the town of Washington, the

[10] HITE, MARY ELIZABETH. MY RAPPAHANNOCK STORY BOOK. 323 pp., illus. 1950.

county seat, had a population of 249. Other towns are Woodville, Sperryville, Amissville, and Flint Hill. Of the total population, 71.1 percent is classed as rural farm and 28.9 percent as rural nonfarm.

In 1935, the State deeded about 37,500 acres of land in the county to the Federal government. This land is in the Blue Ridge Mountains and became a part of the Shenandoah National Park. All people living in the area moved elsewhere.

Industries

Rappahannock County has no large industries. Farm labor is adequate, and many people find employment in the adjoining counties. This county ranks tenth in Virginia in the sale of tree fruits. Several combination cold-storage and fruit-packing plants employ many people during the harvest season, but they do not employ many on a yearly basis. At Sperryville a plant that processes apple juice employs a small number of workers. Three semipermanent sawmills and several portable sawmills operate in the county. The rough lumber from these mills is shipped out of the county for processing.

Transportation and Markets

Rappahannock County has no railroads or bus lines, but it is fairly well served by roads. In 1955, the Virginia Department of Highways reported that there were 83 miles of hard-surfaced roads in the county. Fifty-three miles of these roads are the U. S. Highways 522 and 211. Thirty miles are State roads, and there are 185 miles of State roads in the county without a hard surface.

Several small trucking companies haul orchard fruit and cattle to market. Apples are sold to packing houses in Washington and Sperryville. The fruit is graded, packed, and shipped; or it is put in cold storage so that later it can be shipped south on trucks that haul citrus fruits north. The juice processing plant at Sperryville buys some apples. Some are hauled to Front Royal and Winchester to be processed into apple butter, sauce, juice, jelly, and pie filling.

Most cattle are sold at public auction in Culpeper, Winchester, and Front Royal; a few are sold directly on the farm. A tank truck collects grade A milk daily.

Cultural and Recreational Facilities

Consolidated elementary schools throughout the county provide education for all communities. The only high school is in Washington, but some pupils attend the regional secondary school in Culpeper County. State-owned buses transport the students.

The library in the Washington High School serves adults in the county as well as students. Churches are well distributed throughout the county; some of the larger towns have two denominations. Electricity and telephone services are available to most homes, and a public health office in Washington is staffed by a doctor and a traveling nurse. Volunteer fire departments are in Sperryville, Flint Hill, Castleton, Washington, and Amissville.

The Skyline Drive atop the Blue Ridge Mountains provides varied recreational facilities. Youth clubs and social and fraternal organizations supervise summer camps, community services, and social activities in most communities.

Sportsmen are attracted from other counties and States by the fishing in the Rappahannock, Thornton, and Hazel Rivers. Nearly all of the mountain streams have native trout. Streams in the county are stocked annually with brook and rainbow trout. Many summer cabins and homes are built along the mountain streams.

Glossary

Acidity. The degree of acidity or alkalinity of a soil mass, technically expressed in pH values, or in words, as follows:

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5–5.0
Strongly acid	5.1–5.5
Medium acid	5.6–6.0
Slightly acid	6.1–6.5
Neutral	6.6–7.3
Mildly alkaline	7.4–7.8
Moderately alkaline	7.9–8.4
Strongly alkaline	8.5–9.0
Very strongly alkaline	9.1 and higher

Alluvium. Sand, mud, and other sediments deposited on land by streams.

Local alluvium. Alluvium that originates from the adjacent uplands. It occupies narrow strips along drainageways and is not subject to prolonged flooding.

General alluvium. Alluvium that originates in more distant uplands. In general, it occupies broad, nearly level areas along streams and is regularly subject to flooding.

Bedrock. The solid rock underlying soils.

Clay. Mineral soil particles less than 0.002 millimeter (0.000079 inch) in diameter. (Formerly included particles less than 0.005 millimeter in diameter.)

Claypan. A layer or horizon of accumulation, or a stratum of stiff, compact, and relatively impervious clay.

Colluvium. Mixed deposits of rock fragments and soil material near the base of slopes. The deposits have accumulated through soil creep, slides, and local wash.

Consistence, soil. The combination of properties of soil material that determine its resistance to deformation or rupture. Every soil material has consistence irrespective of whether the mass be large or small, in a natural condition or greatly disturbed, aggregated or structureless, moist or dry. Terms commonly used are *compact, firm, friable, hard, plastic,* and *sticky.*

Compact. Dense and firm but without any cementation.

Firm. Soil material crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Friable. Soil material crushes easily under gentle to moderate pressure between thumb and forefinger; it coheres when pressed together.

Hard. Moderately resistant to pressure; can be broken in the hands without difficulty but is barely breakable between thumb and forefinger.

Plastic. Soil material forms wirelike shape when rolled between thumb and forefinger, and moderate pressure is required to deform the soil mass.

Sticky. After pressure, soil material adheres to both thumb and forefinger and tends to stretch somewhat and pull apart rather than to pull free from either digit.

Contour tillage. Furrows plowed at right angles to the direction of slope, at the same level throughout, and ordinarily at reasonably close intervals.

Cropland. Land regularly used for crops, except forest crops. It includes rotation pasture, cultivated summer fallow, or land that is temporarily idle.

Drainage, soil. The rapidity and extent of the removal of water from the soil, in relation to additions, especially by runoff, by flow through the soil to underground spaces, or by a combination of both processes. As a condition of the soil, soil

drainage refers to the frequency and duration of periods when the soil is free of saturation or partial saturation. Terms related to soil drainage are *runoff, internal drainage, soil permeability,* and *soil drainage classes.*

Runoff. The amount of water removed by flow over the surface of the soil. The amount and rapidity of runoff is closely related to slope and is also affected by factors such as texture, structure, and porosity of the surface soil; the vegetative covering; and the prevailing climate. Relative degrees of runoff are as follows:

Ponded. None of the water added to the soil as precipitation or by flow from surrounding higher land escapes as runoff. Removal is by movement through the soil or by evaporation.

Very slow. Surface water flows away so slowly that free water lies on the surface for long periods or enters immediately into the soil. Very little of the water is removed by runoff.

Slow. Surface water flows away so slowly that free water covers the soil for significant periods or enters the soil so rapidly that only a small amount is removed as runoff. Normally, there is little or no erosion hazard.

Medium. Surface water flows away at such a rate that a moderate proportion of the water enters the soil profile and free water lies on the surface for only short periods. The loss of water over the surface does not reduce seriously the supply available for plant growth. This commonly is considered good external drainage. The erosion hazard may be slight to moderate if soils of this class are cultivated.

Rapid. A large proportion of the precipitation moves rapidly over the surface of the soil, and a small part moves through the soil profile. The erosion hazard commonly is moderate to high.

Very rapid. A very large part of the water moves rapidly over the surface of the soil, and a very small part goes through the profile. The erosion hazard is commonly high or very high.

Internal drainage. That quality of a soil that permits the downward flow of excess water through it. It is reflected in the frequency and duration of periods of saturation. It is determined by the texture, structure, and other characteristics of the soil profile and of underlying layers as well as by the height of the water table, either permanent or perched, in relation to the water added to the soil. Relative terms for expressing internal drainage are as follows:

None. No free water passes through the soil mass.

Very slow. The rate of internal drainage is much too slow for optimum growth of important crops (not water-tolerant or water-loving crops) in humid regions.

Slow. The rate of movement of water through the soil is not so fast as in medium drainage but is faster than in very slow drainage.

Medium. Internal drainage is about optimum for growth of important crops under humid conditions. Medium is considered good internal drainage.

Rapid. Internal drainage is somewhat too rapid for the optimum growth of the important crops of the region.

Very rapid. The rate of movement of water through the profile is very rapid. Internal drainage is too rapid for optimum growth of most of the important crops of the region.

Soil permeability. That quality of the soil that enables it to transmit water and air. Rates of percolation are expressed in inches per hour. Relative classes of soil permeability are *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Soil drainage classes. Relative terms for expressing soil drainage classes are as follows:

Very poorly drained. Water is removed from the soil so slowly that the water table remains at or on the surface the greater part of the time.

Poorly drained. Water is removed so slowly that the soil remains wet for a large part of the time. The water table is commonly at or near the surface during a considerable part of the year.

Imperfectly or somewhat poorly drained. Water is removed from the soil slowly enough to keep it wet for significant periods, but not all of the time.

Moderately well drained. Water is removed from the soil somewhat slowly, so that the profile is wet for a small but significant part of the time.

Well-drained. Water is removed from the soil readily, but not rapidly. A well-drained soil has good drainage.

Somewhat excessively drained. Water is removed from the soil rapidly so that only a relatively small part is available to plants. Only a narrow range of crops can be grown on these soils, and yields are generally low without irrigation.

Excessively drained. Water is removed from the soil very rapidly. Excessively drained soils commonly are shallow to bedrock and may be steep, very porous, or both. Enough precipitation commonly is lost from these soils to make them unsuitable for ordinary crop production.

Erosion. The wearing away of the land surface by detachment and transport of soils and rock materials through the action of moving water, wind, and other geological agents. The classification followed in defining, naming, and mapping the erosion is expressed in terms as follows: *Slightly eroded, moderately eroded, severely eroded,* and *gullied land.*

Slightly eroded. Such soil may have lost as much as 25 percent of the original surface soil, but the plow layer consists almost entirely of surface soil. Soils, the names of which include no erosion terms, are within this class of erosion.

Moderately eroded. Soil eroded to the extent that the subsoil material is within plow depth over about half or more of the delineated area. Ordinary tillage will bring part of the upper subsoil to the surface and alter the original surface soil with an admixture of subsoil material. About 25 to 75 percent of the original surface soil may have been lost. There may be some shallow gullies. The term "eroded" in soil names designates this class of erosion.

Severely eroded. Soil eroded to the extent that all or practically all of the original surface soil has been lost. Tillage is almost entirely in the subsoil material. Short, shallow gullies are common, and a few gullies may be too deep to be obliterated by ordinary tillage.

Gullied land. Areas of soil eroded to the extent that the processes for reclaiming them would be very slow. The areas consist of an intricate pattern of gullies; the profile over most of such areas has been largely mutilated.

Fertility, soil. The inherent quality of a soil as measured by the quantity of compounds provided for proper or balanced growth of plants.

First bottom. The normal flood plain of a stream, subject to a frequent or occasional flooding.

Forest. Land not in farms, bearing a stand of trees of any age or size, including seedlings, and of species that attain a minimum average height of 6 feet at maturity; or land from which such a stand has been removed, but which has been put to no other use. Forest on farms is commonly called woodland or farm forest.

Granular. (See also Structure, type). Roughly spherical aggregates that may be either hard or soft, normally more firm than crumb and without the distinct faces of blocky structure.

Green-manure crop. Any crop grown and plowed under while green for the purpose of improving the soil.

Leaching, soil. The removal of materials in solution by percolating water.

Massive. (See also Structure, grade). Large, uniform masses of cohesive soil, sometimes with ill-defined and irregular breakage, as in some of the fine-textured alluvial soils; structureless.

Mottled. Marked with spots of color and normally associated with poor drainage. Descriptive terms for mottles follow. Contrast—*faint, distinct,* and *prominent;* abundance—*few, common,* and *many;* and size—*fine,* commonly less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* commonly ranging between 5 and 15 millimeters (about 0.2 to 0.6 inch) along the greatest dimension; and *coarse,* commonly more than 15 millimeters (about 0.6 inch) along the greatest dimension.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in elaboration of its food and tissue. Essential nutrients include nitrogen, phosphorus, calcium, potassium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and other elements mainly from the soil; and carbon, hydrogen, and oxygen, largely from the air and water.

Parent material. The unconsolidated mass of rock material (or peat) from which the soil profile develops.

Permeable. Easily penetrated, as by water or air.

Productivity, soil. The capability of a soil to produce a specified plant or sequence of plants under a specified system of management.

Profile, soil. A vertical section of the soil, from the surface into the parent material.

Reaction, soil. (See Acidity).

Relief. The elevations or inequalities of the land surface, the slope gradient, and the pattern of these, considered collectively.

Sand. Rock or mineral fragments having diameters ranging between 0.05 millimeter (0.002 inch) and 2.0 millimeters (0.08 inch). The term sand is also applied to soils containing 85 percent or more of sand; the percentage of silt, plus 1½ times the percentage of clay, shall not exceed 15.

Silt. Mineral soil grains ranging from 0.05 millimeter (0.002 inch) to 0.002 millimeter (0.000079 inch) in diameter.

Soil. Natural body on the surface of the earth characterized by conformable layers resulting from modification of parent material by physical, chemical, and biological forces over a period of time.

Soil separates. The individual size groups of soil particles, as sand, silt, and clay.

Stream terrace. An old alluvial plain that now lies above the present first bottom as a result of entrenchment of the stream. In general, more mature soils are common to stream terraces whereas immature or young soils are common to first bottoms.

Stripcropping. The practice of growing ordinary farm crops in long strips or bands of variable width across the line of slope, or approximately on the contour. Close-growing crops are seeded in alternate strips with clean-tilled crops.

Structure, soil. The aggregation of primary soil particles into compound particles, or clusters of primary particles, which are separated from adjoining aggregates by surfaces of weakness. Soil structure is classified according to *grade*, *class*, and *type*.

Grade. Degree of distinctness of aggregation. It expresses the differential between cohesion within aggregates and adhesion between aggregates. Terms: *Structureless* (single grain or massive), *weak*, *moderate*, and *strong*.

Class. Size of soil aggregates. Terms: *Very fine* or *very thin*, *fine* or *thin*, *medium*, *coarse* or *thick*, and *very coarse* or *very thick*.

Type. Shape and arrangement of individual natural soil aggregates. Terms: *Platy*, *prismatic*, *columnar*, *blocky*, *subangular blocky*, *granular*, and *crumb*. (Example of soil-structure grade, class, and type: Moderate, coarse, subangular blocky). Fine blocky structure peds (aggregates or units) are 5 to 10 millimeters (0.2 to 0.4 inch) in size; medium subangular blocky, 10 to 20 millimeters (0.4 to 0.8 inch); and coarse subangular blocky, 20 to 50 millimeters (0.8 to 2.0 inches). Fine crumb structure peds are 1 to 2 millimeters (0.04 to 0.08 inch) in size, and medium crumb structure peds are 2 to 5 millimeters (0.08 to 0.2 inch).

Subsoil. Roughly, that part of the profile below plow depth.

Surface soil. That part of the upper profile normally stirred by plowing.

Terrace (for control of runoff, erosion, or both). An embankment or ridge constructed across sloping soils, on or approximately on contour lines, at specific intervals. The terrace intercepts surplus runoff in order to retard it for infiltration into the soil or to direct any excess flow to an outlet at nonerosive velocity.

Texture. Refers to the relative proportions of the various size groups of individual soil grains in a mass of soil. Specifically, it refers to the proportions of clay, silt, and sand below 2 millimeters in diameter. A coarse-textured soil is one high in content of sand; a fine-textured soil has a large proportion of clay.

Workability, soil. Refers to the ease of performing tillage, harvesting, and other farming operations on the soil. Texture, structure, consistence, content of organic matter, moisture, stoniness, and slope are major characteristics that affect workability. Workability is expressed in six descriptive terms:

Excellent. Soils of excellent workability are generally coarse to medium textured, stone free, and nearly level. They require a minimum of effort for tillage and harvesting, and all kinds of farm machinery can be used on them.

Very good. Soils of very good workability may have such features as fine texture, small quantities of rock fragments, or somewhat uneven but mild slopes, which make the use of farm machinery somewhat more difficult than on soils that have excellent workability. All common types of farm machinery can be used on them.

Good. Soils of good workability are suited to the use of all common types of farm machinery, but more effort is required to obtain their greatest efficiency than on soils of very good workability.

Fair. Soils of fair workability are poorly suited to the use of heavy farm machinery. Normal farming operations are more difficult than on soils of good workability.

Poor. Silty clay or clay soils, hilly soils, or soils that contain enough chert or gravel to interfere seriously with tillage are classified as having poor workability. The use of all types of farm machinery is almost prohibited.

Very poor. Soils of very poor workability are so steep, cherty, or both, that tillage is generally done with hand implements.

GUIDE FOR MAPPING UNITS

[See table 5, p. 56, for estimated productivity ratings of each soil, and table 4, p. 11, for approximate acreage and proportionate extent of the soils. See pp. 60 to 69 for information on engineering properties of the soils]

Map symbol		*Page*	*Capability unit*	*Page*
	Albemarle fine sandy loam:			
AbB	Gently sloping phase	12	IIe–3	48
AbC	Sloping phase	12	IIIe–3	49
Ad	Alluvial land	13	IIIw–1	50
At	Altavista loam	13	IIw–2	48
Au	Augusta silt loam	14	IIIw–2	50
Be	Belvoir loam	14	IIIw–2	50
	Brandywine gritty loam:			
BgB	Gently sloping phase	16	IVe–2	51
BgC	Sloping phase	16	IVe–2	51
BgD	Moderately steep phase	17	VIe–2	54
	Brandywine loam:			
BoC	Sloping phase	16	IVe–2	51
BoD	Moderately steep phase	15	VIe–2	54
BoE	Steep phase	16	VIIe–1	54
	Brandywine rocky loam:			
BrC	Sloping phase	17	VIs–2	54
BrD	Moderately steep phase	17	VIs–2	54
BrE	Steep phase	17	VIIs–2	55
	Brandywine silt loam:			
BwC2	Eroded sloping phase	17	IVe–2	51
BwD2	Eroded moderately steep phase	17	VIe–2	54
	Brandywine stony loam:			
ByC	Sloping phase	18	IVs–2	53
ByD	Moderately steep phase	18	VIs–2	54
ByE	Steep phase	18	VIIs–2	55
Bz	Buncombe loamy fine sand	18	IIIs–2	51
CaE	Catoctin stony silt loam, steep phase	19	VIIs 2	55
	Chester loam:			
CdB	Gently sloping phase	19	IIe–2	48
CdC2	Eroded sloping phase	20	IIIe–2	49
	Chester-Brandywine loams:			
CeB2	Eroded gently sloping phases	20	IIe–2	48
CeC2	Eroded sloping phases	20	IIIe–2	49
Ch	Chewacla silt loam	20	IIIw–1	50
Co	Congaree fine sandy loam	21	IIw–1	48
	Culpeper clay loam:			
CpC3	Severely eroded sloping phase	23	IVe–1	51
CpD3	Severely eroded moderately steep phase	23	VIe–1	54
	Culpeper loam:			
CuB	Gently sloping phase	22	IIe–2	48
CuC2	Eroded sloping phase	22	IIIe–2	49
	Dyke loam:			
DyB	Gently sloping phase	23	IIe–1	47
DyC2	Eroded sloping phase	24	IIIe–1	49
	Eubanks-Brandywine complex:			
EbC	Sloping phases	26	IIIe–2	49
EbD2	Eroded moderately steep phases	26	IVe–3	51
	Eubanks-Chester complex:			
EcB	Gently sloping phases	26	IIe–2	48
EcC	Sloping phases	27	IIIe–2	49
	Eubanks and Lloyd clay loams:			
ElB3	Severely eroded gently sloping phases	25	IIIe–4	49
ElC3	Severely eroded sloping phases	25	IVe–1	51
ElD3	Severely eroded moderately steep phases	26	VIe–1	54
	Eubanks and Lloyd loams:			
EuB	Gently sloping phases	24	IIe–2	48
EuC2	Eroded sloping phases	25	IIIe–2	49
EyD2	Eubanks and Lloyd stony loams, eroded moderately steep phases	26	VIs–1	54
	Halewood stony fine sandy loam:			
HaC	Sloping phase	27	IVs–1	52
HaD	Moderately steep phase	27	VIs–1	54
HaE	Steep phase	27	VIIs–1	55
	Hazel loam:			
HeC	Sloping phase	28	IVe–2	51
HeD	Moderately steep phase	28	VIe–2	54
HeE	Steep phase	28	VIIe–1	54
	Hazel stony loam:			
HsD	Moderately steep phase	28	VIs–2	54
HsE	Steep phase	28	VIIs–2	55
	Hiwassee clay loam:			
HtB3	Severely eroded gently sloping phase	29	IIIe–4	49
HtC3	Severely eroded sloping phase	29	IVe–1	51

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GENERAL SOIL MAP
RAPPAHANNOCK COUNTY, VIRGINIA

Scale 1 0 1 2 3 4 Miles

N

78°15′ 78°00′ 38°45′

WARREN COUNTY
FAUQUIER COUNTY
RAPPAHANNOCK CO
PAGE COUNTY
MADISON COUNTY
CULPEPER COUNTY
BLUE RIDGE MOUNTAINS
SHENANDOAH NATIONAL PARK
RIVER

WASHINGTON

Flint Hill
Massies Corner
Ben Venue
Smedley
Rediviva
Panorama
Sperryville
Five Forks
Rock Mills
Amissville
Viewtown
Ashbys Corner
Woodville
Hawlin
Scrabble
Round Hill
Estes
Castleton

Indian Run
Jordan River
Battle Creek
Covington River
Bush River
Thornton River
Hazel River
Blackwater Creek
Hughes River

522 211

SOIL ASSOCIATIONS

AREAS DOMINATED BY SOILS WITH LIGHT-COLORED, MEDIUM-TEXTURED SURFACE SOIL AND REDDISH OR YELLOWISH, ACID, CLAYEY SUBSOIL

1. Louisburg-Albemarle-Culpeper Association: Moderately deep and shallow, well-drained and rapidly drained, sloping to steep soils on dissected Piedmont uplands
2. Wickham-Augusta-Altavista Association: Deep and moderately deep, well-drained to somewhat poorly drained, nearly level to gently sloping soils on stream terraces

AREAS DOMINATED BY SOILS WITH BROWNISH OR REDDISH, MEDIUM-TEXTURED SURFACE SOIL AND REDDISH, DARK, ACID, CLAYEY SUBSOIL

3. Stony local alluvial land-Unison-Dyke Association: Deep and moderately deep, well-drained, gently sloping to moderately sloping soils on old colluvial slopes
4. Hiwassee-Brandywine Association: Deep, well-drained, gently sloping and sloping soils on stream terraces, and shallow, rapidly drained, steep soils on adjoining uplands
5. Brandywine-Eubanks-Lloyd-Chester Association: Shallow and moderately deep, well-drained and somewhat rapidly drained, sloping and gently sloping soils on dissected Piedmont uplands

AREAS DOMINATED BY SOILS BROWNISH IN BOTH SURFACE SOIL AND SUBSOIL AND WITH LITTLE OR NO MORE CLAY IN THE SUBSOIL THAN IN THE SURFACE SOIL

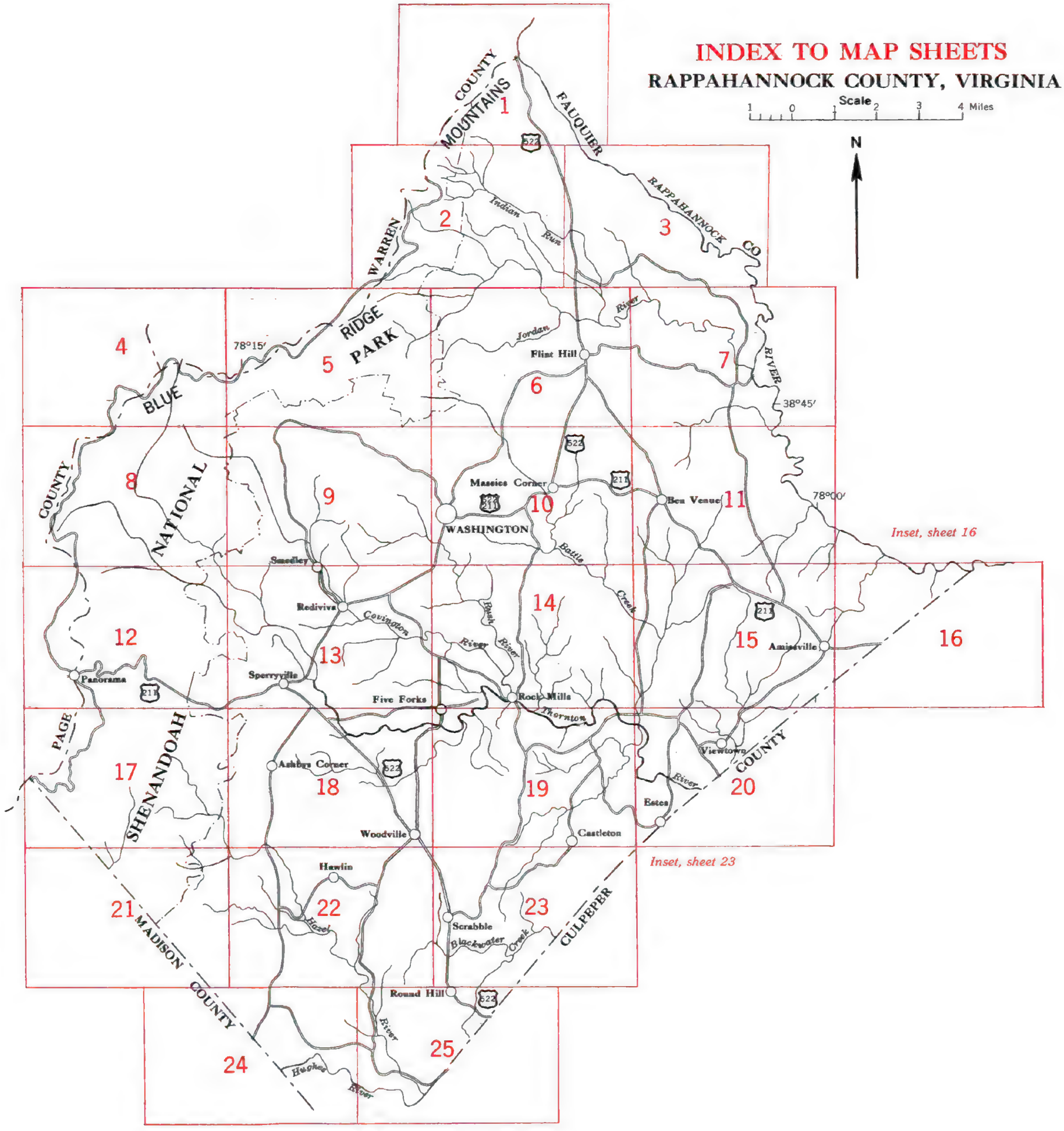
6. Brandywine-Chester Association: Shallow and moderately deep, well-drained and somewhat rapidly drained, sloping and moderately steep silt loam soils on Piedmont uplands
7. Brandywine gritty loam Association: Shallow, rapidly drained, sloping and gently sloping gritty loam soils on Piedmont uplands
8. Louisburg-Hazel Association: Shallow, rapidly drained, steep, stony soils on low Piedmont mountains
9. Brandywine-Rock land, acidic, Association: Shallow, rapidly drained, moderately steep and steep soils and rock land on low Piedmont mountains

AREAS DOMINATED BY YOUNG, MEDIUM-TEXTURED SOILS ON RECENTLY DEPOSITED ALLUVIUM AND COLLUVIUM

10. Alluvial land-Chewacla-Wehadkee Association: Deep to moderately deep, moderately well drained to poorly drained, nearly level soils on first bottoms

AREAS DOMINATED BY ROCK LAND AND VERY ROCKY LAND

11. Rock land, acidic-Halewood-Very rocky land Association: Well-drained and rapidly drained, rocky soils on mountain foothills underlain mainly by granodiorite
12. Very rocky land-Rockland, acidic-Porters Association: Rapidly drained, rocky and stony soils on mountains underlain mainly by granodiorite
13. Very rocky land-Rockland, basic-Myersville Association: Rapidly drained rocky soils on mountains underlain mainly by greenstone


INDEX TO MAP SHEETS
RAPPAHANNOCK COUNTY, VIRGINIA
Scale 1 0 1 2 3 4 Miles
N
COUNTY
MOUNTAINS
FAUQUIER
RAPPAHANNOCK CO.
WARREN
Indian Run
RIDGE
PARK
BLUE
COUNTY
NATIONAL
Jordan River
Flint Hill
RIVER
78°15'
38°45'
78°00'
Massies Corner
WASHINGTON
Ben Venue
Inset, sheet 16
Smedley
Rediviva
Covington
Rush River
Battle Creek
Amissville
Panorama
Sperryville
Five Forks
Rock Mills
Thornton River
PAGE
SHENANDOAH
COUNTY
Ashbys Corner
Viewtown
Estes
Woodville
Castleton
Inset, sheet 23
Hawlin
Hazel River
Scrabble
Blackwater Creek
CULPEPER
MADISON
COUNTY
Round Hill
Hughes River
1
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4
5
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7
8
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16
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18
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20
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22
23
24
25

SOIL LEGEND

Each soil symbol consists of letters or a combination of letters and numbers. The first capital letter is the initial of the soil series name. The second capital letter, if there is one, shows the class of slope and is given wherever slope forms part of the soil name. Some of the soils for which no slope letter is shown are nearly level; some have a range of slope. A final number, 2 or 3, shows that the soil is eroded or severely eroded.

SYMBOL	NAME
AbB	Albemarle fine sandy loam, gently sloping phase
AbC	Albemarle fine sandy loam, sloping phase
Ad	Alluvial land
At	Altavista loam
Au	Augusta silt loam
Be	Belvoir loam
BgB	Brandywine gritty loam, gently sloping phase
BgC	Brandywine gritty loam, sloping phase
BgD	Brandywine gritty loam, moderately steep phase
BoC	Brandywine loam, sloping phase
BoD	Brandywine loam, moderately steep phase
BoE	Brandywine loam, steep phase
BrC	Brandywine rocky loam, sloping phase
BrD	Brandywine rocky loam, moderately steep phase
BrE	Brandywine rocky loam, steep phase
BwC2	Brandywine silt loam, eroded sloping phase
BwD2	Brandywine silt loam, eroded moderately steep phase
ByC	Brandywine stony loam, sloping phase
ByD	Brandywine stony loam, moderately steep phase
ByE	Brandywine stony loam, steep phase
Bz	Buncombe loamy fine sand
CaE	Catoctin stony silt loam, steep phase
CdB	Chester loam, gently sloping phase
CdC2	Chester loam, eroded sloping phase
CeB2	Chester-Brandywine loams, eroded gently sloping phases
CeC2	Chester-Brandywine loams, eroded sloping phases
Ch	Chewacla silt loam
Co	Congaree fine sandy loam
CpC3	Culpeper clay loam, severely eroded sloping phase
CpD3	Culpeper clay loam, severely eroded moderately steep phase
CuB	Culpeper loam, gently sloping phase
CuC2	Culpeper loam, eroded sloping phase
DyB	Dyke loam, gently sloping phase
DyC2	Dyke loam, eroded sloping phase
EbC	Eubanks-Brandywine complex, sloping phases
EbD2	Eubanks-Brandywine complex, eroded moderately steep phases
EcB	Eubanks-Chester complex, gently sloping phases
EcC	Eubanks-Chester complex, sloping phases
ElB3	Eubanks and Lloyd clay loams, severely eroded gently sloping phases
ElC3	Eubanks and Lloyd clay loams, severely eroded sloping phases
ElD3	Eubanks and Lloyd clay loams, severely eroded moderately steep phases
EuB	Eubanks and Lloyd loams, gently sloping phases
EuC2	Eubanks and Lloyd loams, eroded sloping phases
EyD2	Eubanks and Lloyd stony loams, eroded moderately steep phases
HaC	Halewood stony fine sandy loam, sloping phase
HaD	Halewood stony fine sandy loam, moderately steep phase
HaE	Halewood stony fine sandy loam, steep phase
HeC	Hazel loam, sloping phase
HeD	Hazel loam, moderately steep phase
HeE	Hazel loam, steep phase
HsD	Hazel stony loam, moderately steep phase
HsE	Hazel stony loam, steep phase
HtB3	Hiwassee clay loam, severely eroded gently sloping phase
HtC3	Hiwassee clay loam, severely eroded sloping phase
HwB	Hiwassee loam, gently sloping phase
HwC	Hiwassee loam, sloping phase
LoC	Louisburg sandy loam, sloping phase
LoD	Louisburg sandy loam, moderately steep phase
LsE	Louisburg soils, steep phases
LyC	Louisburg stony sandy loam, sloping phase
LyD	Louisburg stony sandy loam, moderately steep phase
Ma	Made land
Me	Meadowville loam
MyC	Myersville stony silt loam, sloping high phase
MyD	Myersville stony silt loam, moderately steep high phase
PoB	Porters stony loam, gently sloping phase
PoC	Porters stony loam, sloping phase
PoD	Porters stony loam, moderately steep phase
PoE	Porters stony loam, steep phase
RaE	Ramsey stony fine sandy loam, steep phase
Rd	Riverwash
Re	Roanoke silt loam
RkD	Rockland, acidic, moderately steep phase
RkE	Rock land, acidic, steep phase
RoD	Rock land, basic, moderately steep phase
RoE	Rock land, basic, steep phase
Rp	Rock outcrop
Sa	Stony alluvial land
Sc	Stony colluvial land
StB	Stony local alluvial land, gently sloping phase
StC	Stony local alluvial land, sloping phase
StD	Stony local alluvial land, moderately steep phase
UcB	Unison cobbly loam, gently sloping phase
UcC	Unison cobbly loam, sloping phase
UnB	Unison loam, gently sloping phase
UnC2	Unison loam, eroded sloping phase
UpB	Unison loam, gently sloping fragipan variant
Ve	Very rocky land
We	Wehadkee silt loam
WhB	Wickham loam, gently sloping phase
Wo	Worsham silt loam
Ws	Worsham stony silt loam

Soil map constructed 1959 by Cartographic Division, Soil Conservation Service, USDA, from 1950 aerial photographs. Controlled mosaic based on Virginia plane coordinate system, north zone, Lambert conformal conic projection, 1927 North American datum.

CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Roads
- Good motor
- Poor motor
- Trail
- Marker, U. S. (33)

Railroads
- Single track
- Multiple track
- Abandoned

Bridges and crossings
- Road
- Trail, foot
- Railroad
- Ferry
- Ford
- Grade
- R. R. over
- R. R. under
- Tunnel

Buildings
- School
- Church
- Station

Mine and Quarry

Dump

Pits, gravel or other

Power line

Pipeline

Cemetery

Dam

Levee

Tank

Sawmill

Forest fire or lookout station

BOUNDARIES

- National or state
- County
- Township, civil
- Township, U. S.
- Section line, corner
- Reservation
- Land grant

DRAINAGE

Streams
- Perennial
- Intermittent, unclass.

Canals and ditches (CANAL, DITCH)

Lakes and ponds
- Perennial
- Intermittent

Wells (flowing)

Springs

Marsh

Wet spot

RELIEF

Escarpments
- Bedrock
- Other

Prominent peaks

Depressions

	Large	Small
Crossable with tillage implements		
Not crossable with tillage implements		
Contains water most of the time		

SOIL SURVEY DATA

- Soil type outline and symbol (Dx)
- Gravel
- Stones, very stony
- Rock outcrops
- Chert fragments
- Clay spot
- Sand spot
- Gumbo or scabby spot
- Made land
- Gullies

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

(Joins sheet 1)

(Joins sheet 3)

(Joins sheet 5)

(Joins sheet 6)

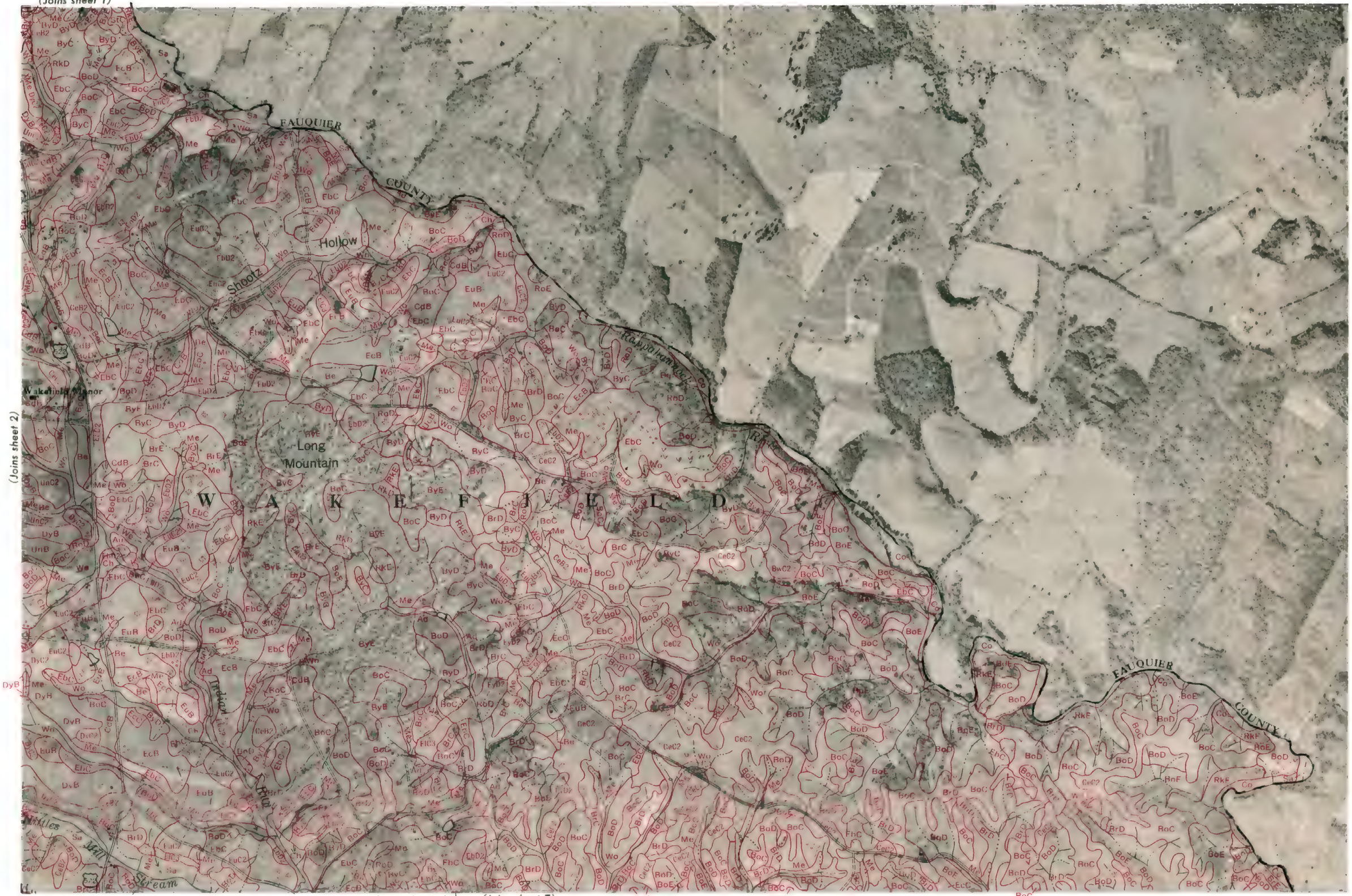
Scale 1:20000

0 1 Mile

0 5000 Feet

(Joins sheet 1)

(Joins sheet 2)



(Joins sheet 6)

½ (Joins sheet 7)

0 1 Mile

Scale 1:20 000

0 5000 Feet

N

3

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(4)

N

(Joins sheet 5)

(Joins sheet 8)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

(Joins sheet 2)

5

N

Hogwallow Flat

Blue Ridge Mountains

Appalachian Trail

Warren County

Mount Marshall

Skyline Drive

Gravel Springs Lodge

Little Hogback Mountain

Devils Stairs

The Peak

Falls

WAKEFIELD

SHENANDOAH NATIONAL PARK

HAMPTON

(Joins sheet 4)

(Joins sheet 6)

(Joins sheet 9)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

RAPPAHANNOCK COUNTY, VIRGINIA - SHEET NUMBER 6

(Joins sheet 2) | (Joins sheet 3)

N

(Joins sheet 5)

(Joins sheet 7)

(Joins sheet 10)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

(Joins sheet 3)

(Joins sheet 6)

(Joins sheet 11)

WAKEFIELD

JACKSON

FAUQUIER COUNTY

Jordan

Rappahannock

Hickman Run

Piney Run

Fog Mountain

The Kennels

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

N

7

(Joins sheet 4)

(Joins sheet 9)

(Joins sheet 12)

N

Elkwallow Gap

Little Devils Stairs

MOUNTAINS

SKYLINE DRIVE

APPALACHIAN TRAIL

RIDGE

PAGE COUNTY

APPALACHIAN

BLUE

TRAIL

HAMPTON

PIEDMONT

SHENANDOAH NATIONAL PARK

APPROXIMATE BOUNDARY

Thornton River

Piney River

Pinnacle Branch

Fork Mountain

Pignut Mountain

Scale 1:20000

0 1/2 1 Mile

0 5000 Feet

RAPPAHANNOCK COUNTY, VIRGINIA - SHEET NUMBER 9

(Joins sheet 5)

9

N

(Joins sheet 8)

(Joins sheet 10)

(Joins sheet 13)

SHENANDOAH NATIONAL PARK

PIEDMONT

RIDGE

BIG HAMPTON

JENKINS MOUNTAIN

Wolfe Mountain

Massies Mountain

Little Jenkins Mountain

Harris Hollow

Bush River

Keister Run

Pickerell Run

Corrington River

Smedley

Scale 1:20 000

0 ½ 1 Mile

0 5000 Feet

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RAPPAHANNOCK COUNTY, VIRGINIA - SHEET NUMBER 10

(Joins sheet 6)

N

Fodderstack Mountain

Big Mulkey Mountain

Flekatson Mountain

WAKEFIELD

HAMPTON

WASHINGTON

Rappahannock County High School

Massies Corner

Rose Hill

Gouge Mountain

Round Mountain

(Joins sheet 9)

(Joins sheet 11)

(Joins sheet 14)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

(Joins sheet 7)

(11)

N

WAKEFIELD

Meeting House Mountain

APPROXIMATE

SOUTH FORK

J A C K S O N

Ben Venue

FAUQUIER COUNTY

(Joins sheet 10)

(Joins Inset, sheet 16)

(Joins sheet 15)

0 ½ 1 Mile

Scale 1:20 000

0 5000 Feet

(Joins sheet 8)

N

Beahms Gap

Frazier Hollow

North Fork Thornton River

Pass Mountain

S H E N A N D O A H

N A T I O N A L P A R K

P I E D M O N T

Butterwood Branch

RIDGE AND VALLEY APPALACHIAN TRAIL

BLUE RIDGE MOUNTAINS

Panorama

Thornton Gap

SKYLINE DRIVE

South Fork Thornton River

Overton Mountain

Beech Spring

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

(Joins sheet 13)

(Joins sheet 17)

(Joins sheet 9)

13

N

Thomas Mountain

Little Jenkins Mountain

Jordan Mountain

Rediviva

Piney Branch

North Fork Thornton River

SHENANDOAH NATIONAL PARK

PIEDMONT

HAMPTON

Sperryville

South Fork Thornton River

Turkey Mountain

(Joins sheet 12)

(Joins sheet 14)

(Joins sheet 18)

0 1/2 1 Mile

Scale 1:20000

0 5000 Feet

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(Joins sheet 10)

(Joins sheet 13)

(Joins sheet 15)

(Joins sheet 19)

N

HAMPTON

Round Mountain

Battle

Chapel Mountain

Rappahannock River

Thornton River

Rock Mills

JACKSON

APPROXIMATE BOUNDARY

1 Mile

5000 Feet

Scale 1:20 000

RAPPAHANNOCK COUNTY, VIRGINIA - SHEET NUMBER 15

15

(Joins sheet 11)

N

(Joins sheet 14)

(Joins sheet 16)

J A C K S O N

Amissville

Battle Run

Little Battle Mountain Run

Big Battle Mountain

Little Battle Run

(APPROXIMATE BOUNDARY)
CULPEPER COUNTY

(Joins sheet 20)

0 1/2 1 Mile

Scale 1:20000

0 5000 Feet

16

Me *(Joins inset below)*

N

(Joins sheet 15)

JACKSON

FAUQUIER COUNTY

CULPEPER COUNTY

(APPROXIMATE BOUNDARY)

(Joins sheet 11)

(Joins top of sheet)

0 ½ 1 Mile

Scale 1:20 000

0 5000 Feet

(Joins sheet 12)

N

Marys Rock
Skimmer Ridge
Buck Hollow
Buck Ridge
Spring Hollow
Beech Spring
Woodards Arm Mountain
Jenkins Hollow
Meadow Spring
APPALACHIAN TRAIL
DRIVE
SKYLINE
BOUNDARY
White Rocks
PIEDMONT
SHENANDOAH NATIONAL PARK
PAGE COUNTY
The Pinnacle
MADISON COUNTY
HAWTHORNE
Hazel Mountain
Carter Mountain
Hannah Run
Sams Run
Thorough Mountain
Hazel River
S Fork Thornton R.

0 ½ 1 Mile
Scale 1:20000
0 5000 Feet

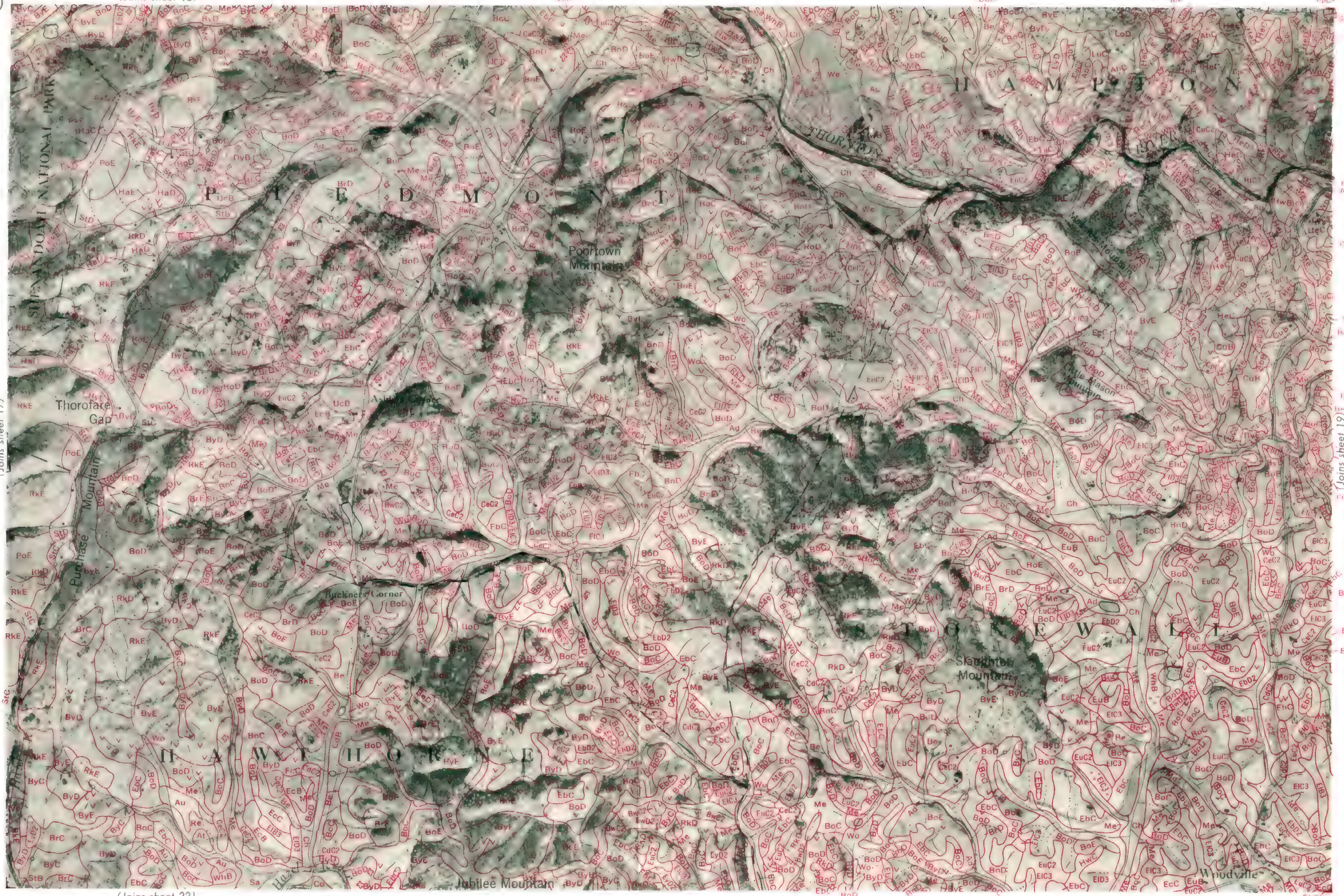
(Joins sheet 21)

(Joins sheet 18)

(Joins sheet 13)

N

(Joins sheet 17)



(Joins sheet 22)

(Joins sheet 19)

0 ½ 1 Mile

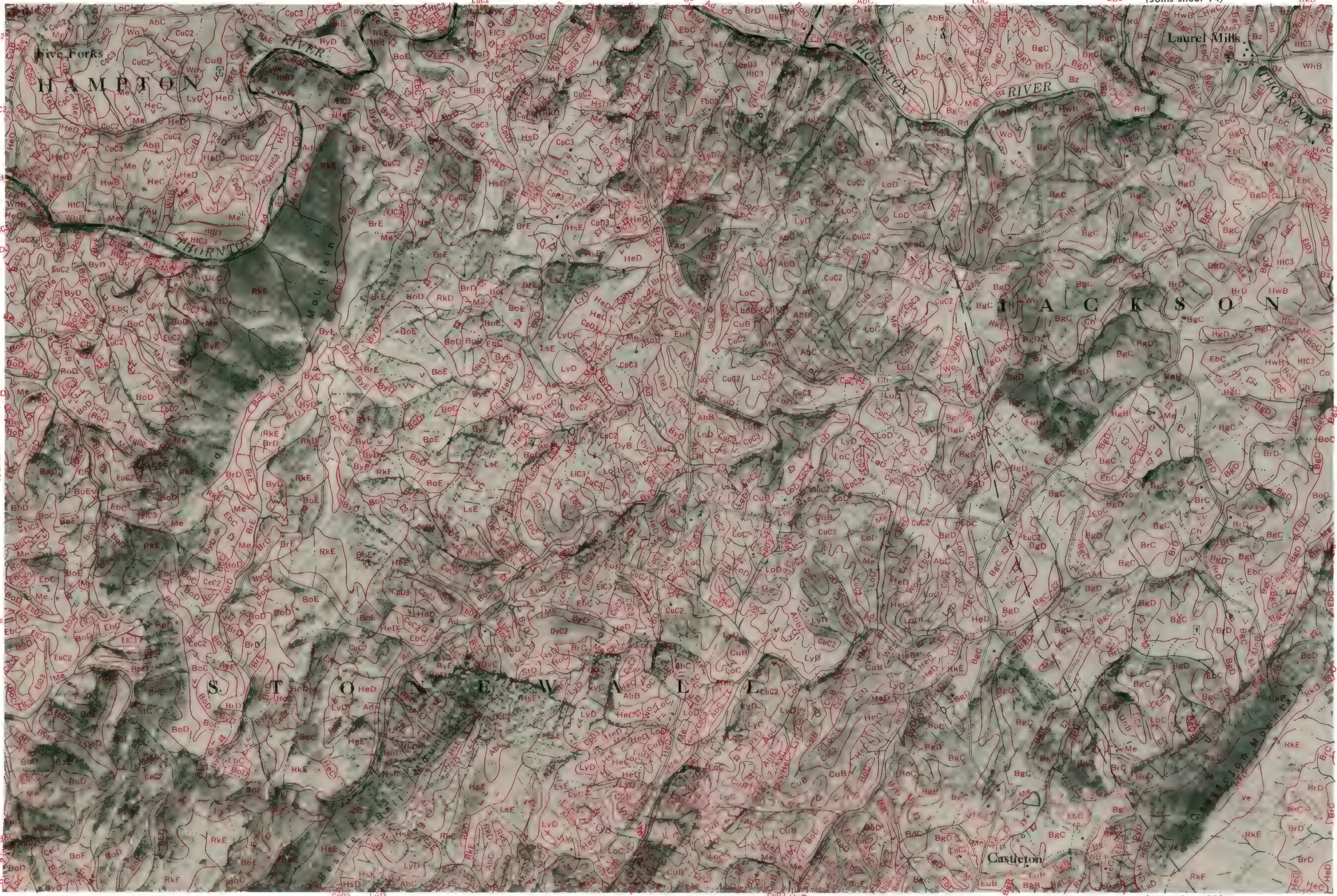
Scale 1:20000

0 5000 Feet

(Joins sheet 14)

(Joins sheet 18)

(Joins sheet 20)



(Joins sheet 23)

Scale 1:20 000

0 1/2 1 Mile

0 5000 Feet

This map is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1950

RAPPAHANNOCK COUNTY, VIRGINIA - SHEET NUMBER 20

(Joins sheet 15)

(Joins sheet 19)

(Joins sheet 23)

N

Battle Run

Viewtown

JACKSON

THORNTON RIVER

(APPROXIMATE BOUNDARY)

CULPEPER COUNTY

Estes

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

RAPPAHANNOCK COUNTY, VIRGINIA - SHEET NUMBER 21

(Joins sheet 17)

21

N

SHENANDOAH NATIONAL PARK

HAWTHORNE

Hot Mountain

Broad Hollow

Pine Hill Gap

Pine Hill

MADISON COUNTY

Rocky Run

Browns Gap

fire trail

(Joins sheet 22)

(Joins sheet 24)

0 ½ 1 Mile

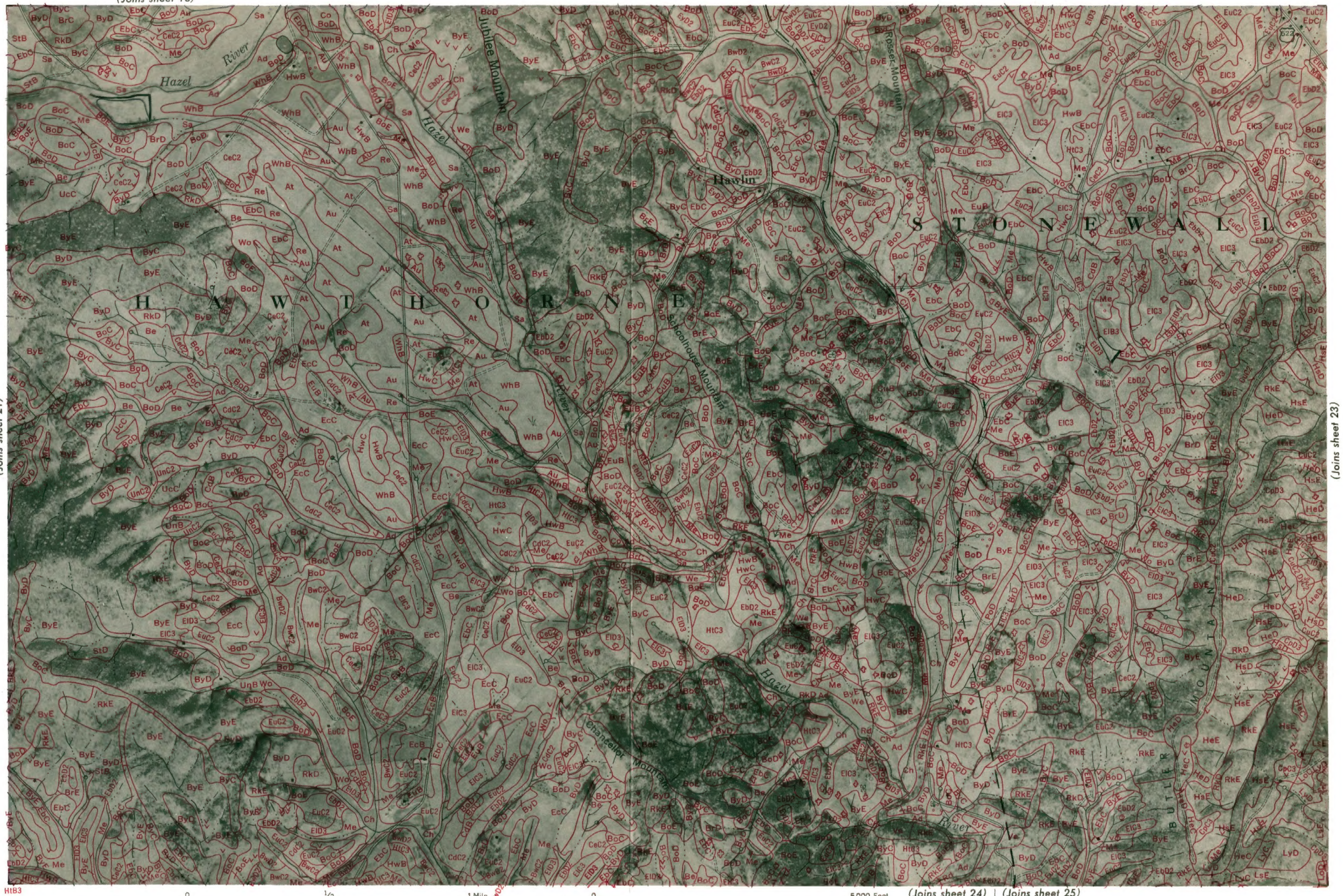
Scale 1:20000

0 5000 Feet

22

(Joins sheet 18)

N



(Joins sheet 21)

(Joins sheet 23)

0 ½ 1 Mile Scale 1:20000 0 5000 Feet

(Joins sheet 24) | (Joins sheet 25)

RAPPAHANNOCK COUNTY, VIRGINIA - SHEET NUMBER 23

(Joins sheet 19)

JACKSON

(Inset)

N

STONEWALL

Blackwater

Scrabble

Scrabble School

Bower Mountain

Turkey Ridge

Blackwater Creek

APPROXIMATE BOUNDARY

CULPEPER COUNTY

(Joins sheet 22)

(Joins sheet 25)

BoC (Joins sheet 20)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

RAPPAHANNOCK COUNTY, VIRGINIA - SHEET NUMBER 24

24

N

(Joins sheet 21) (Joins sheet 22)

(Joins sheet 25)

Hughes River

Riverecombs Corner

Peola Mills

H A W T H O R N E

MADISON COUNTY

CULPEPER COUNTY

Scale 1:20 000

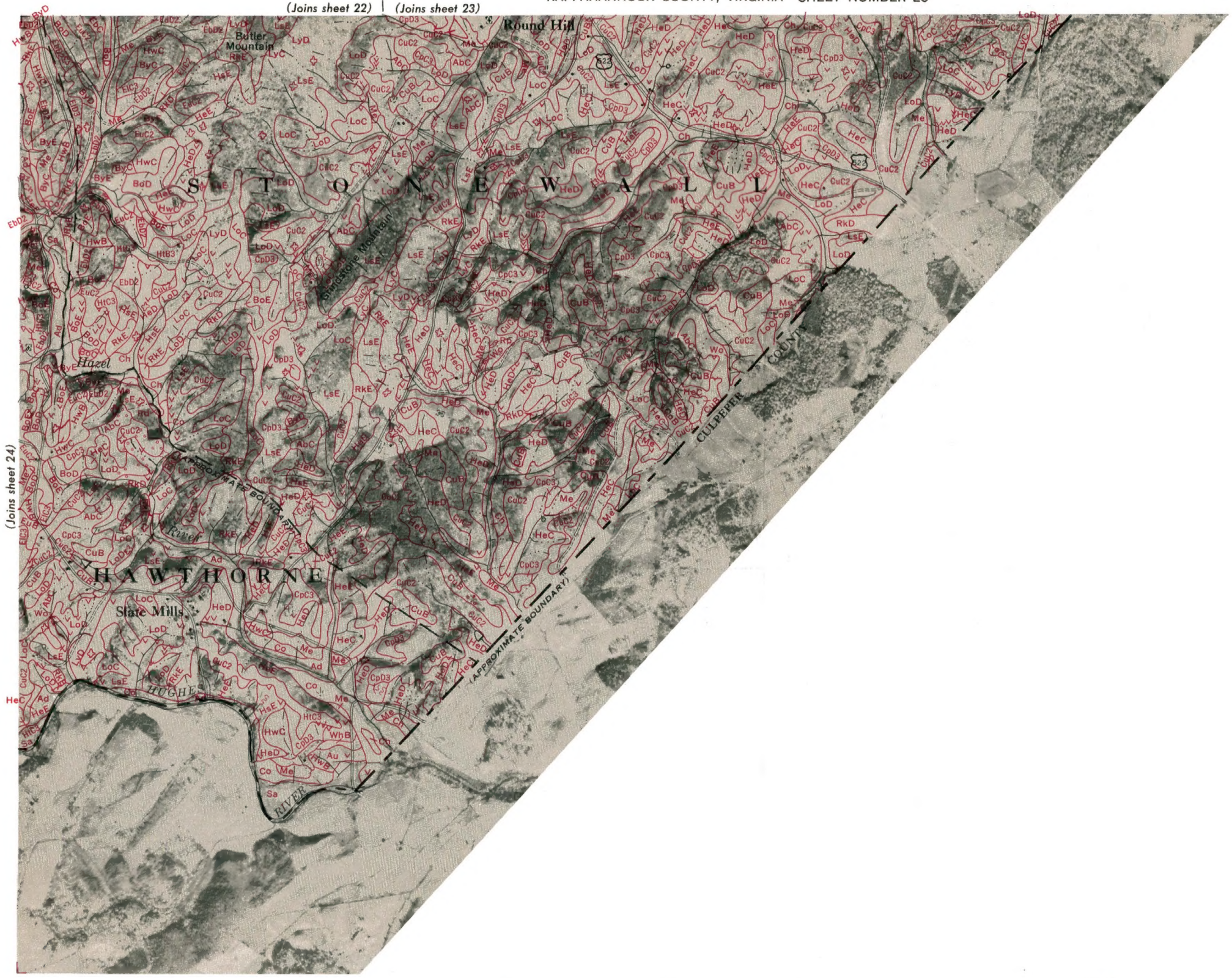
0 ½ 1 Mile

0 5000 Feet

(Joins sheet 22)

(Joins sheet 23)

(Joins sheet 24)



N

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet